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ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

RFCA Standard Operating Protocol for Facility Disposition

Predecisional Draft for Public Comment

April 17, 2000

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Acronyms

ALARA	as low as reasonably achievable
ALI	annual limit of intake
APEN	Air Pollutant Emissions Notice
ARA	Airborne Radioactivity Area
ARAR	Applicable or Relevant and Appropriate Requirements
CAQCC	Colorado Air Quality Control Commission
CCR	Colorado Code of Regulations
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
DAC	derived air concentration
DDCP	RFETS Decontamination and Decommissioning Characterization Protocol
dB	decibels
DOE	United States Department of Energy
DOT	United States Department of Transportation
dpm	disintegrations per minute
DPP	RFETS Decommissioning Program Plan
DQO	data quality objectives
EDE	effective dose equivalent
EPA	United States Environmental Protection Agency
ER	Environmental Restoration
FDPM	Facility Disposition Program Manual
HAP	hazardous air pollutants

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HASP	Health and Safety Plan
IHSS	individual hazardous substance site
IMP	Integrated Monitoring Plan
IWCP	Integrated Work Control Program
l	liter
LLMW	low level mixed waste
LLW	low level waste
LRA	Lead Regulatory Agency
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
ODC	ozone depleting compounds
OSHA	Occupational Safety and Health Administration
PA	Protected Area
PAC	potential area of concern
PCB	polychlorinated biphenyls
PM	particulate matter
PMP	Project Management Plan
PPE	personal protective equipment
RAAMP	radiological ambient air monitoring program
RCRA	Resource Conservation and Recovery Act
RLC	reconnaissance level characterization
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RSOP	RFCA Standard Operating Protocol
RSP	Radiological Safety Practices
SHPO	State Historical Preservation Office
SNM	Special Nuclear Material
SWPPP	Surface Water Pollution Prevention Plan
TPY	tons per year
TRU	transuranic waste
TRUM	mixed transuranic waste
TSP	total suspended particulate
TWA	time weighted average
UBC	under building contamination
VMT	vehicle miles traveled
WEMS	Waste Environmental Management Systems
WGI	waste generating instructions
WSRIC	Waste Stream Residue Identification and Characterization

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EXECUTIVE SUMMARY

A Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) is an approved protocol that applies to a routine decommissioning and environmental restoration activity regulated under RFCA An RSOP can be used in lieu of preparing a project-specific RFCA decision document for repetitive, routine activities An RSOP must be approved only once, although it may be used on several projects However, DOE must notify the Lead Regulatory Agency (LRA) that the RSOP will be used on a specific project, and the project must utilize the consultative process outlined in RFCA and the Decommissioning Program Plan (DPP) to ensure that the regulators are involved in the implementation of the RSOP Since decommissioning activities are often similar in nature, RSOPs are an effective way to document work processes while minimizing paperwork at the project level

This RSOP may be applied to all facilities at the Rocky Flats Environmental Technology Site (RFETS or Site) that meet the unrestricted release criteria The RSOP was developed to establish the demolition process requirements and controls, assess the environmental consequences, and document the facility disposition decision and requirements associated with the facility demolition process The requirements in the RSOP will be applied using the graded approach dependent on the facility type, worker health and safety, surrounding environment, and cost

This RSOP contains a description of the facilities that could utilize this document and the anticipated facility types It also contains an assessment of the alternatives for facility disposition The results of the alternatives analysis indicated that decommissioning is the selected alternative for all facilities at RFETS Decommissioning includes component removal, decontamination, and demolition activities This RSOP includes a technical description of the demolition process to include demolition methods and equipment and the controls required during demolition The demolition approach section will be used by the individual projects implementing the RSOP to specify the exact methods, equipment, and controls that will be used during demolition The project-specific demolition process will be documented in an Occupational Safety and Health Administration (OSHA)-required Demolition Plan and RFETS Integrated Work Control Program (IWCP) packages

An analysis was conducted and included in the RSOP on the environmental consequences of facility disposition activities and the transportation of low level and low level mixed wastes associated with facility decommissioning activities Although the demolition activities described in this document will not generate low level and low level mixed wastes, the RSOP does detail the alternative analysis for facility disposition, therefore, the environmental impacts of transportation of this waste is addressed in this document This analysis indicates that the adverse effects of facility disposition are short term whereas the beneficial effects are long term For example, during the facility disposition process, there may be increased air and noise emissions, however, once facility dispositioning is complete, the area will be available for other uses, and the hazards associated with any contamination previously in the facilities will be removed from the Site

Finally, this RSOP contains a listing of the regulatory requirements associated with facility dispositioning and details on implementing facility dispositioning The requirements in this RSOP, in conjunction with the requirements in the DPP and Site procedures, ensure that facility disposition activities are consistent with the long-term remedial objectives of leaving the Site in a condition that is protective of human health and the environment and allows future land uses consistent with the Rocky Flats Vision

1. INTRODUCTION

This RSOP documents the facility disposition decision for the facilities at RFETS In addition to the decision, the document provides the Site facility information, technical approach to demolition activities, environmental and health and safety controls, waste management system, the applicable or relevant and appropriate requirements (ARARs) for the proposed action, and an assessment of the environmental consequences associated with the proposed action and the transportation of waste resulting from decommissioning The purpose of this RSOP is to

- Document the facility disposition decision for all facilities at RFETS,
- Fulfill the consultative process obligations for Type 1 facilities,
- Establish the process and requirements, in conjunction with Site procedures, for Type 2 and 3 facility demolition,
- Establish environmental and worker health and safety controls for Type 2 and 3 facility demolition,
- Assess environmental consequences of facility disposition,
- Describe the interface with environmental restoration, and
- Assess scope of the facility demolition process

The technical approach, environmental and health and safety controls, waste management processes, and ARARs in this RSOP are applicable to demolition activities for Type 2 and 3 facilities The demolition activities addressed in this RSOP will include the removal of the facility structure to at least 3 feet below grade During decommissioning planning, a determination will be made on the RFCA decision document requirements based on the scope of the project If this RSOP can be used to implement work activities, then a notification letter will be prepared The notification letter will detail the proposed facility (ies), the facility-specific administrative record index, and deviations from the RSOP If a DOP must be prepared, the notification letter will also indicate the anticipated schedule/status of the DOP, only applies to Type 3 facilities

There are a significant number of potential contaminant release sites documented in RFCA that may require remediation and are associated with buildings or supporting infrastructure including roads, parking lots and utilities In the Industrial Area, approximately 90 percent of the potential release sites qualify in this category These sites cannot be remediated until removal of the facility or infrastructure is substantially complete Decommissioning will interface with ER to maximize the benefits of an integrated approach to Site activities The interface points are described in Section 4 of this RSOP

It is assumed that prior to implementing the RSOP, the excess equipment has been removed, asbestos has been removed, canyon rooms have been dispositioned, decontamination is complete and the facility meets unrestricted release criteria All of these activities will have been conducted in accordance with other RFCA decision documents This RSOP may be executed after the pre-demolition survey has been completed and the *Pre-Demolition Survey Report* has been approved by the LRA Figure 1 outlines the decommissioning documentation process

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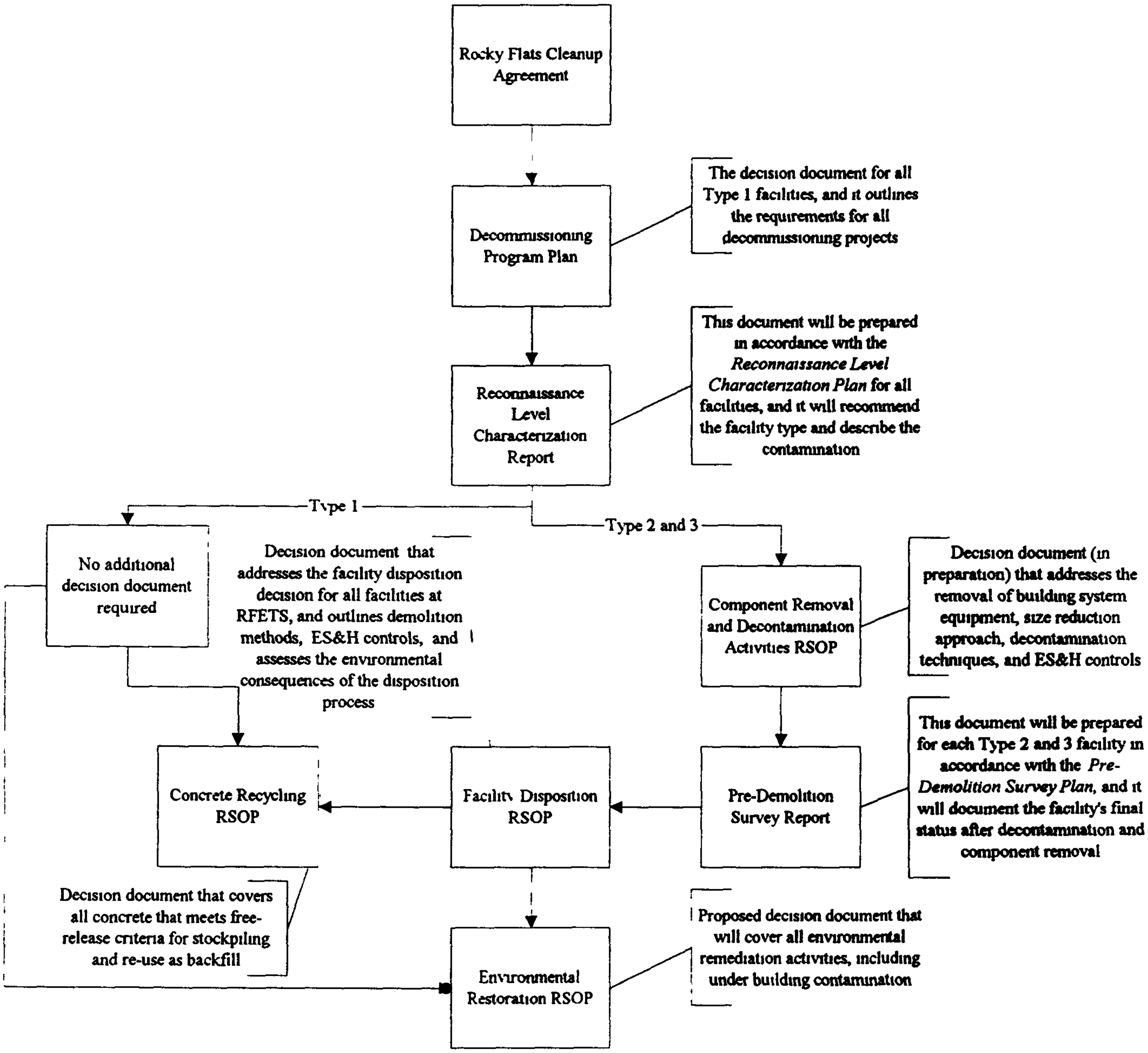
Figure 1. Decommissioning Documentation Process



The Site procedures, plans, and manuals identified in this RSOP identify the principal documents by which the facility disposition process is controlled at the Site These documents are subject to change as the process is improved, and the procedure numbers and titles may be changed without revision to this RSOP There are several project-specific plans that will be developed during the dispositioning process (for example, Waste Management Plan, Project Management Plan, Demolition Plan, and IWCP work packages) These documents are developed based on the requirements of the Site decommissioning program and are not subject to the RFCA approval process These documents are available for review by the regulators and the public, and the consultative process will be utilized throughout the project implementation

2. FACILITY AND CLUSTER DESCRIPTIONS

This section provides information on the facilities at RFETS and how those facilities will be handled in accordance with this RSOP The facilities have been grouped into clusters A cluster may contain several facilities including buildings, trailers, tanks, cooling towers, and miscellaneous or small structures Attachment 1 contains a summary table of the cluster and facility information Attachment 1 is based on current information and includes tanks and other equipment that do not have square footage These items were included for completeness and will dispositioned as equipment in accordance with RFETS procedures Attachment 1 is included for information purposes and changes to that table will not require a revision to this RSOP

This RSOP may be applied to Type 2 and 3 facilities and provides information on Type 1 facilities, which do not require other RFCA decision documents The following is a brief description of the facility type from the DPP

- Type 1 facilities are free from contamination
- Type 2 facilities are without significant contamination or hazards, but in need of decontamination
- Type 3 facilities have significant contamination and/or hazards

The RFCA decision document for Type 1 facilities is the DPP However, if a cluster is being demolished and the cluster includes a Type 1 facility, then the Type 1 facility may be included in the RSOP notification letter, the Demolition Plan, and the IWCP documentation for the cluster The Type 1 facilities are included in the RSOP for information and no other requirements or controls apply to Type 1 facilities

The DPP, Section 3 3 7 requires that Type 3 facilities be decommissioned pursuant to a Decommissioning Operations Plan (DOP) However, the facility-specific DOP could reference this RSOP, as applicable for demolition activities, which would reduce the scope of DOP preparation The RSOP notification letter for a Type 3 facility should indicate what requirements and controls from the RSOP will be utilized during the Type 3 demolition and reference the appropriate DOP and its schedule of preparation

Facilities may be demolished as a cluster or one or several facilities may be demolished while the remaining facilities are demolished at a later time The notification letter indicating that the RSOP will be executed will specify the facility number with a brief description of the facility

3. ALTERNATIVES ANALYSIS AND SELECTION

Three alternatives were considered for the near- and long-term management of RFETS facilities The preamble to RFCA and the RFETS' Vision statement both contain the objective that all contaminated facilities will be decontaminated, as required, for future use or demolition The evaluation of the scope of work for all RFETS facilities considered the following three alternatives

- Alternative 1 - Decommissioning of the Facility (Demolish)
- Alternative 2 - No Action with Safe Shutdown Maintenance (Mothball)
- Alternative 3 - Reuse of the Facility (Reuse)

The alternatives were evaluated for effectiveness, implementability and relative costs The alternative analysis is summarized in Table 1 Alternative 1 is the selected alternative Decommissioning of all RFETS facilities clearly supports the RFETS' vision of safe, accelerated, and cost-effective closure The alternative has the lowest-life cycle costs, achieves the fastest risk-reduction, and is integrated with the Site operations This alternative also maintains long-term protectiveness of public health and the environment Short-term impacts to the environment (i e , impacts during the duration of the action) can be physically and administratively controlled There are no significant negative aspects to decontamination, as required, and decommissioning of all RFETS facilities By removing RFETS facilities, any potential Site risk from the facilities is removed, which is consistent with the goal to close RFETS by year 2006

Alternative 2, No Action with Safe Shutdown Maintenance, does not immediately achieve the RFETS' goals The alternative does not accomplish accelerated closure and defers decommissioning This results in an increase in the life-cycle cost of closure The short-term protectiveness of human health and the environment is achieved by inaction because the facilities are maintained in a safe and stable configuration However, the protectiveness of Alternative 2 is only achieved until the time the facilities are decommissioned Waste and debris requiring treatment and/or disposal, and the risks associated with managing them are not eliminated from facility closure under this alternative

Evaluations by the Site Facilities Use Committee indicate that reuse of RFETS facilities is not required or beneficial, therefore, Alternative 3 is not feasible This evaluation is documented in the *Facility Assessment for the Industrial Area Reuse Study* This evaluation did not include 41 CFR – Realty Officer Approval for the purposes of declaring all of the buildings excess The real property assets will be declared excess or dispositioned according to the Closure Project baseline schedule and with Realty Officer approval prior to facility disposition action

As with Alternative 2, implementation of this action will result in the deferral, not elimination, of eventual decommissioning of the facilities necessary to achieve the RFETS' vision

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Table 1. Alternative Analysis Summary.

Alternative	Description	Effectiveness	Implementability	Relative Cost
1 - Decommissioning	Decommissioning activities will follow RFCA decision documents approved by DOE and CDPHE or EPA Activities consist of Additional decontamination (e g , post-deactivation) as deemed necessary; decommissioning to include dismantlement, demolition, and waste generation Any remediation waste generated by decommissioning would be transported to an appropriate facility for storage followed by disposal	Decommissioning is effective in achieving the long-term goals of the Rocky Flats Vision by not only decontaminating the facilities, as required but also demolishing the aboveground structures to 3 feet below grade and removing or stabilizing underground structures The mortgage costs of the cluster are eliminated and the risk remaining following the action will be significantly lower than the risk that exists under the current condition	Technology currently exists to achieve the objectives of this alternative both technically and administratively Integration with other site activities (e g , waste storage capacity) can be accomplished RFCA establishes the cleanup levels	Decommissioning has the lowest life-cycle cost due to the fact that ultimately the RFETS facilities must go through decommissioning and incorporate this cost into its baseline
2 - No Action with Safe Shutdown Maintenance	No action will maintain the RFETS facilities in their current configuration No additional equipment would be removed unless the present safe shutdown status of the facility became compromised	No action will delay decommissioning activities and meeting the goals of the Rocky Flats vision The alternative is effective in achieving the near-term goal identified in the RFCA preamble Deferring the decommissioning of the RFETS facilities could make funding available for other removals Long-term goals could be jeopardized if the structural integrity of the mothballed facilities increases risk to workers and the environment	Administratively, this alternative is not ideally implementable because the integrated sitewide baseline has planned for the decommissioning of all RFETS facilities No Action could cause a disruption to the long-term goals for RFETS	No action would have the life-cycle costs of decommissioning (adjusted for future value) in addition to landlord/surveillance costs necessary to maintain a mothballed facility (structural continuity, fire prevention, etc) until demolition occurs
3 - Reuse	Reuse of the RFETS facilities would keep the facilities in their current configuration A new mission for the facilities would need to be assigned by the Site Facilities Use Committee Depending on the nature of the new mission, additional removal of equipment may be necessary The current configuration utilities and equipment would be maintained until a new facility mission was defined	Reuse of RFETS facilities was evaluated by the Sites Facilities Use Committee, and it was determined that there was not further mission for the RFETS facilities Use of the RFETS facilities for an alternative off-site use was evaluated in accordance with DOE Order 4300 1C, Subparagraph g, Disposal of Government-Owned Land improvements No future use was identified through this evaluation	Because no new mission has been identified for RFETS facilities, and because the site-wide integrated baseline has identified the decommissioning of all facilities in the near future, implementing this alternative is neither feasible nor reasonably foreseeable at this time	This alternative could result in the greatest life-cycle costs if the reuse mission requires the expenditure for modifications to the facilities in addition to landlord/ surveillance costs and then the decommissioning costs (adjusted for future value) once the new mission has expired and the facilities are demolished

4. DEMOLITION APROACH

This section contains a description of the demolition approach and will be used by RFETS project management to determine the appropriate methods of demolition and environmental and health and safety controls The requirements to protect the environment and the workers are mandatory The IWCP work packages will be developed to ensure that these criteria are met The demolition methods may be customized to meet the needs of the individual demolition project The following paragraphs summarize the existing Site documents that will be used to implement demolition activities and process

As required by RFCA, the DPP establishes the regulatory steps for decommissioning facilities The DPP is the primary RFCA decision document for decommissioning activities The primary DPP Site implementing documents are the *Facility Disposition Program Manual* (FDPM) and the *RFETS Decontamination and Decommissioning Characterization Protocol* (DDCP) The FDPM establishes the processes for facility decommissioning, and outlines the project-specific documentation and how facility decommissioning activities relate to the Site programs The DDCP establishes the processes for characterizing a facility during decommissioning activities

Facility decommissioning involves several phases of planning, execution, and closeout The planning phases involve assessing the status of the facility and determining the best method and process of decommissioning Planning activities will be documented in project-specific *Project Management Plans* (PMP), which will be updated throughout the life of the project All work activities during planning and execution will be controlled through IWCP work packages

The decision to implement the RSOP would be made during decommissioning planning During decommissioning planning activities, the reconnaissance level characterization (RLC) is completed, and the DOE concur with the RLC Report The RLC Report will contain the facility type determination Once the facility typing is documented and the extent of decommissioning activities has been determined, the facility project manager, with concurrence from the DOE and consultation with the regulators, will determine the scope of the RFCA decision documentation The following is a simplified outline of the decommissioning process after RLC is completed

1 Scoping meeting is held – discussions are held at this time on the appropriate RFCA decision documents, including the uses of RSOPs
2 RSOP notification letter(s) are written and/or RFCA decision document(s) is initiated
3 The PMP and Waste Management Plans are updated
4 The authorization basis is revised, if necessary, and IWCP work packages are prepared for decontamination and component removal
5 A readiness evaluation is conducted, as necessary
6 Facility decontamination and component removal are initiated with concurrent in process characterization
7 The pre-demolition survey is conducted
8 The *Pre-Demolition Survey Report* is prepared, reviewed, and approved by DOE and the LRA

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9 The Demolition Plan and IWCP work packages for demolition are prepared, reviewed and approved
10 Demolition is completed
11 Final project closeout reports and documentation are prepared
12 LRA approval of closeout report
13 Remediation activities are initiated, as necessary

Although this process is laid out in a sequential manner, many of the activities may overlap For instance, pre-demolition survey may be conducted in rooms adjacent to decontamination activities, while demolition activities are initiated in another portion of the facility All of the thirteen steps/processes described will have the opportunity for information exchanges and participation with DOE, K-H and its subcontractors, the regulatory agencies, and the public

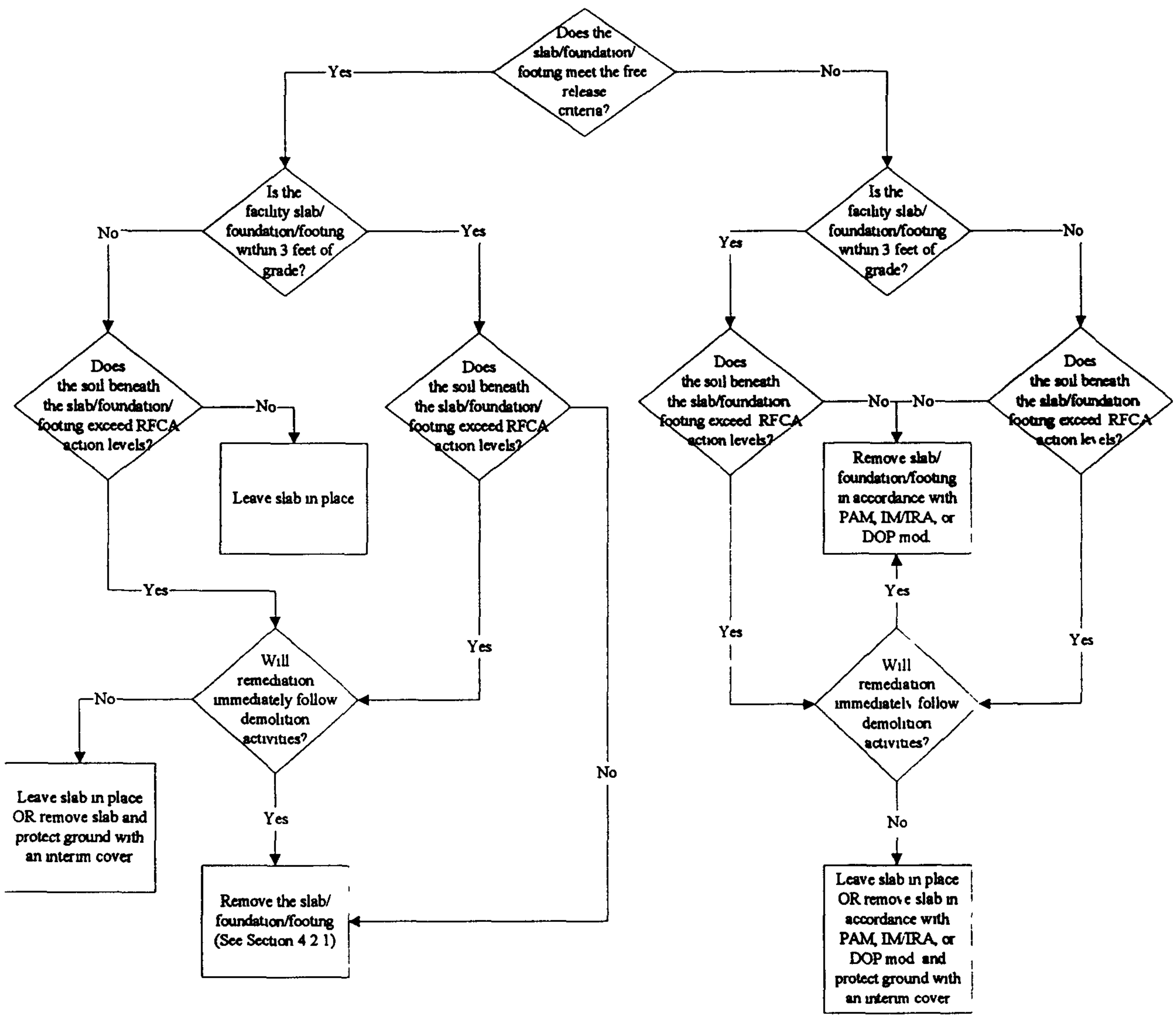
Demolition activities will include the removal of the slab, foundation or facility footing to at least 3 feet below ground surface If the slab, foundation or footing does not meet the unrestricted release criteria after decontamination activities or there is soil contamination beneath the slab, foundation or footing, the slab, foundation or footing will be removed beyond 3 feet below ground surface in accordance with the requirements of this RSOP Figure 2 is a decision tree that documents the disposition of slabs, foundations and footings The disposition of the soil beneath the facility is not within the scope of this RSOP, but will be addressed by Environmental Restoration (ER) in a separate RSOP The following section provides additional detail with respect to the decommissioning and ER interface

ER Transition

Decommissioning will interface with ER to achieve an integrated process to minimize risk to workers and the environment, minimize generation of remediation wastes, streamline technical processes and reduce project costs Project interface points will be as follows

- Generally, the ER schedule will be integrated with decommissioning schedules so that physical integration of fieldwork will begin with ER characterization starting during facility deactivation or decommissioning
- Whenever possible, the subcontractor with primary responsibility for facility demolition will also conduct ER remediation Demolition and ER remediation will proceed as an uninterrupted two-phase operation culminating in closeout of the associated individual hazardous substance sites (IHSSs), potential areas of concern (PACs) and under building contamination (UBC)
- Decommissioning will remove all electrical and water utilities associated with the facilities Underground utilities will be left in a stable condition outside of the facility footprint, and a map will be maintained annotating the locations and sources of these utilities
- Decommissioning will remove process waste lines, tanks and any other lines associated with the process waste transfer system (new process waste lines) within or as part of the facilities, and will blank off the process waste lines at the facility perimeter, and a map will be maintained annotating the locations and sources of the process lines

Figure 2. Slab/Foundation/Footing Disposition Process



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- Decommissioning will remove old process waste lines within or as part of the facilities, and ensure that any remaining lines at the facility perimeter are blocked, and a map will be maintained annotating the locations and sources of the process lines
- ER will assess and be responsible for determining the actions for remediating contaminated soil and associated process waste lines beneath floor slabs
- Decommissioning will flush and remove sanitary sewer lines, tanks and equipment associated with facilities to the isolation valve of the main system line The flushing conducted by Decommissioning will consist of flushing the system with clean water
- In general, Decommissioning will remove any structural material within 3 feet of the existing ground surface This will include facility slabs and foundations unless otherwise required by ER based on remediation requirements
- Decommissioning will remove any structures below 3 feet of the existing ground surface when the structure prevents access to underlying soil that requires remediation, or when the structure cannot be unrestricted released The removal will include the foundation and at least three feet of the footings/pilings Any remaining footings/pilings will be assessed and may be removed during ER activities
- ER will remove sidewalls of facilities below the 3-foot mark if ER determines that the exterior of the wall is contaminated by an IHSS to the extent that the wall must be removed to meet remediation goals
- ER will remove floor slabs that are below the 3-foot mark if necessary to remediate UBC
- In the event that decommissioning of a facility with a high potential for UBC occurs well before scheduled soil remedial actions, ER may specify that facility slabs be left in place to provide continued containment on probable contaminated soil This decision will be made on a case-by-case basis and will be documented in writing with concurrence from both groups and will be included in the project administrative record
- In the event that a time gap occurs between the decommissioning and ER phases as described above, the Site's landlord organization will provide surveillance and maintenance of the facility slab during the interim The hand-off from decommissioning to the landlord organization will be documented in writing between decommissioning, ER and the landlord organization
- If the dispositioning of a facility involves groundwater intrusion, sampling will be conducted by ER to determine if the groundwater is contaminated If the groundwater is contaminated, an assessment will be made by ER to determine if the groundwater could impact surface water If the water is contaminated, but there is no threat to surface water protection standards, the groundwater will be left in the subsurface structure with appropriate controls to protect the health and safety of workers and the public until remediation by ER If the water is contaminated and is a threat to surface water protection standards, the water will be pumped to a treatment facility until remediated by ER Table 2 provides some potential scenarios with respect to groundwater and surface water actions during decommissioning This table is an example of potential conditions and actions to be taken Project-specific controls will be detailed in the Demolition Plan and IWCP package for the demolition activity ER actions, details, and requirements will be detailed in the ER RSOP

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Table 2. Matrix of Groundwater Actions

Condition	Action
Groundwater, surface water, utility water or precipitation is collecting in the excavation or work areas during decommissioning, and it must be managed to ensure safe work areas and protection of the environment	As required, temporarily manage water as per the Incidental Water Program during decommissioning and/or ER activities
Prior to decommissioning activities, water is collecting in sumps, vaults, or other below ground structures and pumped to Site treatment facilities	This water will continue to be collected and treated at Building 374 or other Site facilities as required to protect surface water and to maintain appropriate work environments until decommissioning is completed and/or until ER work is completed as required
Prior to decommissioning activities, water is collecting in sumps, vaults, or other below ground structures but is not pumped or treated	Water will not be collected, removed, or treated unless required to protect surface water quality or workers
There are potential surface water impacts from foundation drains	The pathway to surface water from foundation drains will be removed by ER, either through drain removal, grouting or other effective mechanism unless these are disturbed during decommissioning In that case, Decommissioning will remove the foundation drains
Potential future surface water impacts from decommissioning activities	Pathways to surface water from building decommissioning activities will be monitored by the Surface Water and Groundwater Monitoring Programs as required in the Integrated Monitoring Plan

4.1 Pre-Demolition Survey

A pre-demolition survey will be conducted to verify the nature and extent of radiological and chemical contamination in the facility The survey will be conducted in accordance with DDCP In general, the characterization process will incorporate the following steps

1 The project develops characterization packages for taking final measurements and samples
2 The DOE and LRA review the sampling results
3 Independent verification of the characterization data will be conducted on the facilities where appropriate An independent verification is an independent contractor taking its own measurements and samples, and/or reviewing the Site's results
4 The LRA, at its discretion, may review the results from an Independent Verification
5 During the characterization process, the LRA will have access to facilities to collect samples or measurements, at its discretion

4.2 Facility Demolition

Once the pre-demolition survey is complete and the Pre-Demolition Survey Report has been concurred by the LRA, demolition activities can be planned and initiated All demolition activities will be executed using the RFETS IWCP This process is used to evaluate work packages that provide work control and incorporates the *Integrated Safety Management* (ISM) principles The ISM principles ensure workers are involved in the planning, hazard identification, and implementation of the demolition activities The IWCP package review process evaluates the activity, hazard identification, mitigation measures and compliance with the authorization basis documents The LRA may participate in the IWCP package meetings and roundtable discussions and use these meetings as a forum for RFCA consultation

The IWCP work packages will contain the detailed work instructions, selected demolition methods, and demolition sequence including engineered radiation controls, health and safety practices, and waste management requirements Work instructions will be written such that they can be used directly from the IWCP package

A qualified and experienced demolition contractor will perform all demolition activities, and a Colorado registered structural engineer and certified safety professional will continually monitor demolition activities to ensure that the demolition activities are conducted safely The qualification requirements for the contractor will be documented in the project scope of work The demolition contractor will prepare a Demolition Plan prior to initiating demolition activities The Demolition Plan will detail the methods to be used to collapse the facility, the sequencing of events, and be prepared in accordance with OSHA § 1926, Subpart T The Demolition Plan will contain the following minimum information

- An engineered survey of the structure that determines the condition of the framing, floors and walls
- Shoring and bracing requirements and information for facilities that have been damaged by fire, flood, explosion, or other cause
- Shut off, capping, and control measures for all electric, gas, water, steam, sewer, and other service lines
- Temporary relocation and/or protection for any utilities that need to be maintained through demolition activities
- Elimination or control of any remaining hazardous chemicals, gases, explosives, flammable materials, or dangerous substances
- Removal of glass and implementation of fall protection in areas where falling through a wall opening taller than 42 inches will be possible
- Cordoning off areas where material will be dropped without a chute with barricades not less than 42 inches high and not less than 6 feet back from the protected edge of the opening
- Covering of all floor openings with material substantial enough to support the weight of any reasonably expected load
- The sequence of demolition activities, which will generally start from the top of the structure and proceed downward The exterior walls of the top stories will be dropped before the

exterior wall on the lower floors Exceptions can be made for cutting holes in floors for chutes, holes for dropping materials, and preparation of storage space

- Protection of employee entrances with sidewalk sheds and canopies providing a minimum of 8 feet from the face of the facility and at least 2 feet wider than the facility entrance

4.2.1 Unrestricted Release Demolition

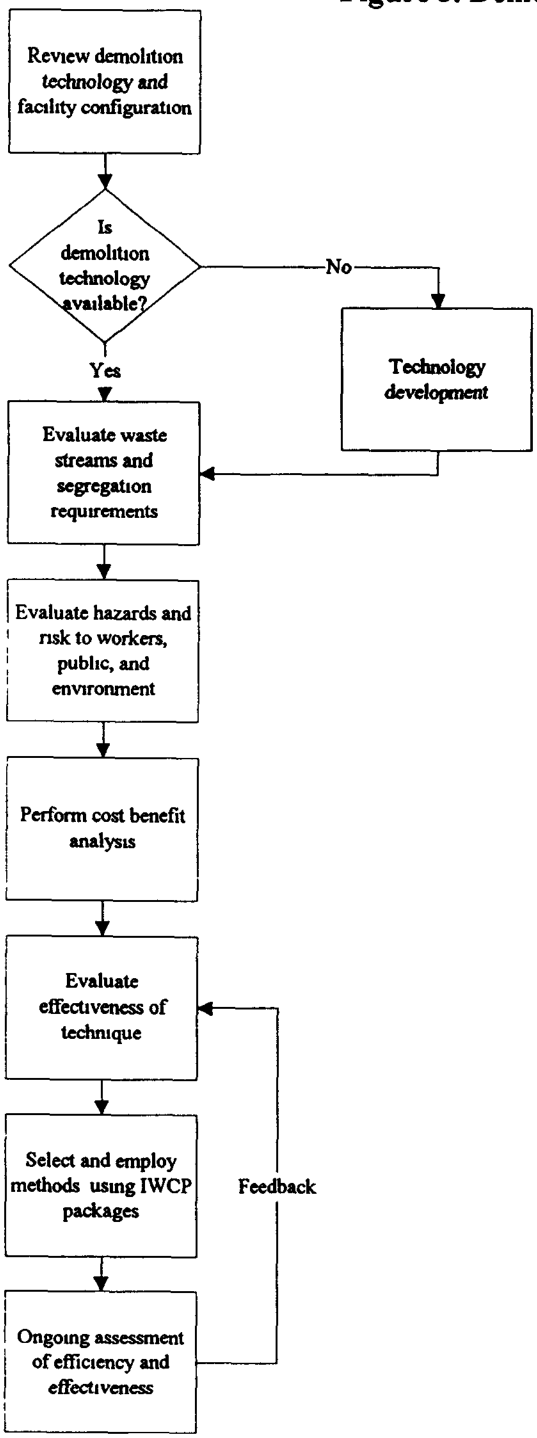
A facility can be classified as an unrestricted release demolition if the entire facility meets the unrestricted release thresholds Once the facility meets the unrestricted release criteria, an IWCP package will be written to implement the demolition methods selected from Section 4 2 2 The selection of demolition methods will depend on the construction of the facility and its proximity to other facilities A facility will have the following configuration prior to initiating demolition

- The facility will be isolated from all Site utilities
- The *Pre-Demolition Survey Report* will be complete and concurred to by DOE and LRA
- As appropriate, the following systems will be removed from the facility
  - Zones 1 and 2 ventilation
  - House vacuum
  - Process piping
  - Electrical distribution
  - Alarm systems,
  - Filter plenums
  - Control room
  - Emergency diesel and support systems
- Asbestos containing material will be removed
- All below grade openings will be plugged, capped, blind flanged or covered with protective covering, when appropriate
- The Demolition Plan will be completed

4.2.2 Demolition Methods

Facility demolition will involve large mechanical equipment, which can include wrecking ball/crane, an excavator equipped with a hydraulic hoe-ram and grapple, and front-end loaders to demolish, size reduce, segregate, and load the concrete, steel and other facility materials into waste containers or stockpiles The primary demolition steps and mechanical techniques for dismantling, segmenting, and demolishing will be provided in the IWCP work packages for the project The following sections provide information on the different demolition equipment The equipment manufacturer or supplier operations and maintenance requirements will be followed The facility-specific Demolition Plan will indicate which methods will be used during demolition activities and the IWCP work packages will detail the methods Figure 3 illustrates the demolition methods selection process

Figure 3. Demolition Method Selection Process



4.2.2 1 Wrecking Ball

A wrecking ball is generally used for demolishing nonreinforced or lightly reinforced concrete structures less than 3 feet thick The equipment consists of a 2-5 ton ball suspended from a crane boom The industry standard method of use is to raise the ball with a crane between 10 to 20 feet above the structure and release the cable brake, allowing the ball to drop onto the target surface This method achieves good fragmentation of the structure, maintains maximum control of the ball after impact, and maintains control of the debris by dropping the debris within the footprint of the facility The wrecking ball is recommended for nonradioactive concrete structures because the release of dust is difficult to control Dust management is documented in greater detail in Section 4 3 1

4.2.2 2 Excavator Mounted Attachments

Excavator mounted attachments are industry standard for a wide variety of demolition projects, and provide controlled demolition Controlled demolition means various attachments mounted to an excavator are used to methodically disassemble a structure The basic attachments to an excavator include concrete pulverizers, shears, grapples, and rams The attachments perform the following functions

- Pulverizers crush concrete and separates rebar and encased steel beams
- Shears sever metals, structural steel, wood, rubber, and plastic
- Grapples serve as an all-purpose tool for demolition and material handling
- Rams demolish concrete structures up to 6 feet thick with a moil or chisel point

Concrete pulverizer jaws are capable of separating rebar and embedded steel beams from concrete Plate shears are used for clean cutting steel plate up to 1¼ inches thick The plate shears are more applicable to decommissioning and can be used to dismantle above and below ground tanks and to cut separated rebar Grapples are versatile and provide a wide range of uses including demolition, scrap recycling, and material handling Grapples can be used as an alternative to loaders and buckets as a tool for demolition cleanup

The ram is a resistance driven tool that begins operating as soon as the chisel point touches the work piece and stops as soon as the chisel is lifted or clear the work piece Air powered rams are used for lightly reinforced concrete that is less that 2 feet thick Hydraulic rams can be used for demolition of much larger sections of concrete, up to 6 feet thick, and are available with heads capable of delivering approximately 7,000 to 10,000 foot pounds of energy per blow

4.2.2.3 Diamond Wire Cutting

Diamond wire cutting involves a series of guide pulleys that draw a loop of multi strand wire strung with a series of diamond beads and spacers through a cut The required length of the wire is obtained by assembling standard length sections of wire end-to-end using screwed sleeves A contact tension is kept on the wire, and this force with the spinning wire cuts a path through concrete and rebar Linear wire speed is adjustable from approximately 0 to 5,900 feet per minute, and wire tension can be adjusted from approximately 1 to 330 pounds The wire is wrapped around the object to be cut and tension is applied If an internal cut is required, drilling is necessary to allow the wire too be fed through the holes Concrete of almost any thickness can be cut with this technique

A benefit of the wire cutting is the flexibility of the pulley system, which allows cutting at unusual configurations This flexibility also allows easy and safe cutting in areas with restricted access and remote cutting in hazardous and radioactive environments

4.2.2.4 Cabling

Cabling involves the use of a large cable and one or more bulldozers A cable is sized so that it will fit around the facility and withstand the pressure of bulldozer and the facility weight The cable is wrapped around the facility and attached to one or more bulldozers The bulldozer size and number is dependent on the size of the facility The bulldozers apply tension to the cable until the facility collapses

4.2.2.5 Non-Explosive Cracking Agent

A non-explosive cracking agent is a chemical that can be used to fracture concrete without explosives The cracking agent is a powder, liquid, or putty that is mixed with water and poured into holes, as it hardens, it exerts pressures up to approximately 12,000 psi, which fractures the concrete The cracking agent does not work instantly, it often takes up to 12 hours to fracture the concrete

There are several types of non-explosive cracking agent and each manufacturer will have a specific method for using the agent Generally, several holes are drilled in the area to be fractured The hole diameter and depth must be sized according to manufacturer's recommendation, but are generally not larger than 1½ inches in diameter or 10 feet in depth

Non-explosive cracking agents are generally not cost effective in slabs less than 5 inches Non-explosive cracking agents can be used in combination with other methods The cracking agent will produce cracks, and an excavator with attachments can complete the demolition activity If non-explosive cracking agents are used, the IWCP package will include the manufacturer's recommendations, a step-by-step procedure, Material Safety Data Sheets, and checklist for using the cracking agent

4.2.2.6 Explosives

The use of explosives for the demolition of facilities will require extensive planning using the Demolition Plan and IWCP work packages A subcontractor will be selected that specializes in controlled demolition through the use of explosive materials The Demolition Plan will meticulously outline the steps involved including the test shot, type and placement of explosive material, and shot sequence The IWCP package will contain checklists that verify the steps required before, during, and after placement of the explosive materials, and the safety measures that will be employed to ensure that the performance criteria in Section 4 3 and 4 4 are maintained

A walkthrough of the facility will be conducted with the explosives subcontractor and appropriate Site personnel This walkthrough will involve reviewing the original structural drawings and collection of a core sample(s) of the concrete The sample will be used in calculations to determine the type and quantity of explosive materials required A test shot will be conducted to verify the calculations The test shot will involve the setting and activating the proposed explosive material on a nonstructural portion of the facility to verify the concrete fracturing A test shot will not be required if there is already sufficient detail on the facility and concrete, as determined by the explosive subcontractor

The use of explosives will require an evaluation of the health and safety and economic benefits The evaluation process should involve regulatory input as well as technical input from specialists in the explosives field Due to the age and condition of some of the facilities, the use of explosives may be the only safe method of demolition The safety and economic evaluation will be documented and included in the project's administrative record along with the qualification of the selected subcontractor A public briefing will be conducted on any demolitions utilizing explosives

4.3 Environmental Protection and Monitoring

Environmental impacts will be minimized using procedures designed to prevent uncontrolled release of waste, to control water run-on and run-off, and to minimize fugitive dust emissions The environmental protection procedures will be detailed in the project-specific IWCP packages Figure 4 illustrates the environmental control method selection process

4.3.1 Migratory Bird Clearance

All demolition projects will need to request a migratory bird clearance to ensure compliance with the Migratory Bird Treaty Act, which prohibits destruction of birds or their nests, active or inactive, without a permit This inspection is for nesting birds in and around the facilities prepared for demolition The inspection is valid for 2 weeks, if demolition has not commenced within 2 weeks, the inspection will need to be repeated

4.3.2 Air Emissions Control

All demolition projects will need to assess the dust generation potential All contractors performing demolition at RFETS will prepare a dust control plan prior to initiating demolition activities, pursuant to CAQCC, Regulation 1 Some combination of the following methodologies will be used to control fugitive dust

- Controlled water spray will be used to minimize fugitive dust emissions during demolition
- Facility debris will be loaded into waste roll-off containers that will be covered to control fugitive dust emissions
- Demolition activities will be terminated during periods of high winds, if necessary to control fugitive dust
- Roads will be periodically cleaned with a street sweeper
- Dust control devices or shrouds will be used on individual equipment

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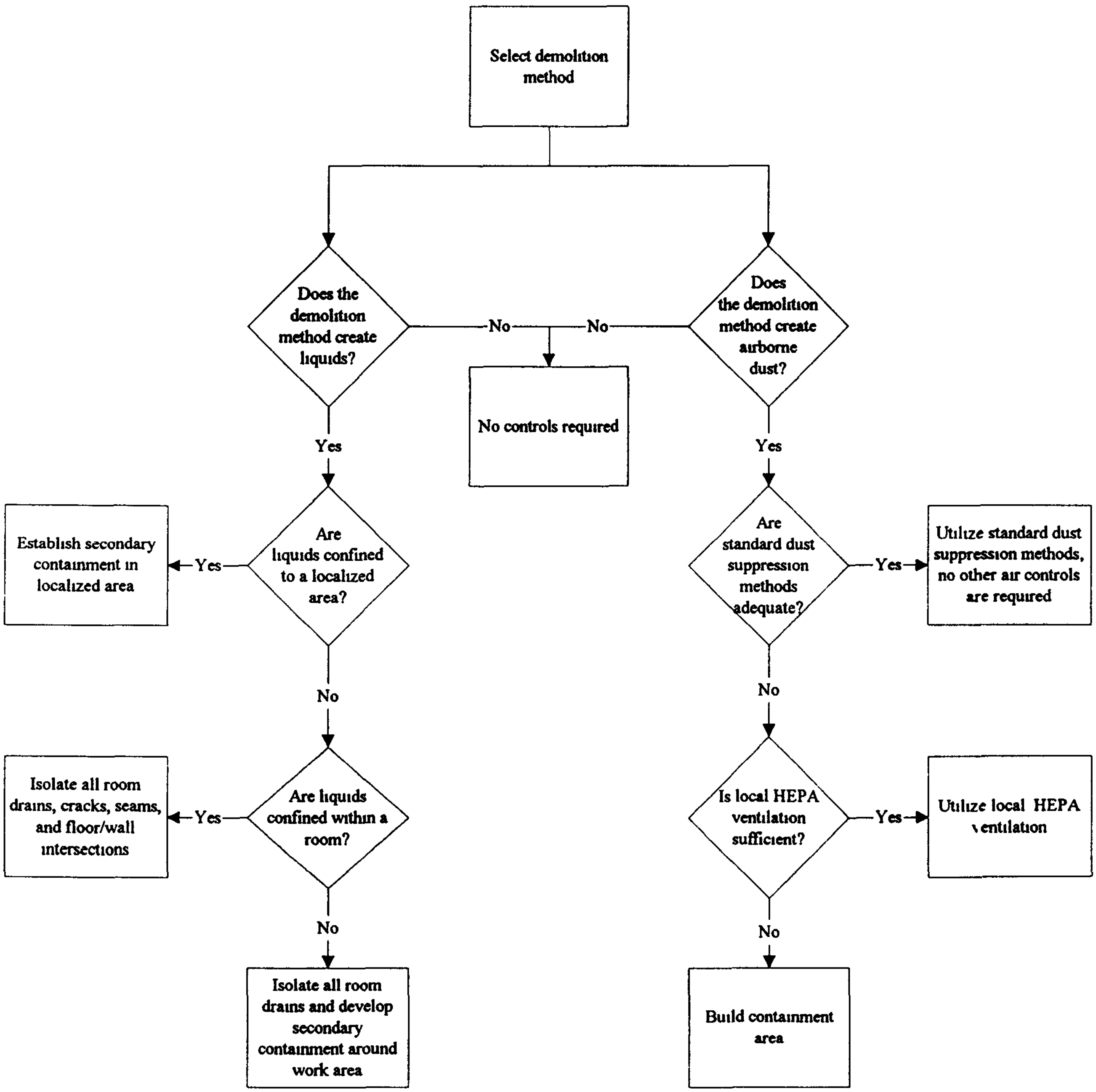
Figure 4. Environmental Control Method Selection



All demolition projects will establish a maximum wind velocity action level (typically 15 mph) All demolition activities will cease when the action level is exceeded Dust will be predominantly controlled through the application of water Depending on the facility location, a water truck or wagon or a hydrant will be used Water will be applied in a controlled manner to manage the dust without resulting in excess ponding or run-off

The existing Site Radioactive Ambient Air Monitoring Program (RAAMP) sampler network will be used for ambient air monitoring during demolition The RAAMP sampler network continuously monitors airborne dispersion of radioactive materials from the Site into the surrounding environment Thirty-seven samplers comprise the RAAMP network Fourteen of these samplers are deployed at the Site perimeter and are used to confirm Site compliance with the 10 millirem standard mandated in 40 CFR 61, Subpart H Filters from the 14 perimeter RAAMP samplers and from one on-Site sampler near the 903 Pad are collected and analyzed monthly for uranium, plutonium, and americium isotopes In addition to the perimeter network, enhanced radionuclide ambient air sampling will be performed on an as-needed basis utilizing RAAMP samplers in the immediate vicinities of the individual demolition projects

The emissions results from all facility activities will be compiled and submitted annually for incorporation into the *RFETS Integrated Monitoring Report*

4.3.3 Surface Water

Surface water will be controlled using standard construction methods including silt fences, berms, hay bales, and diversion ditches The surface water will not be contained or sampled during demolition activities The surface water will be controlled with best management practices that will be detailed in the Demolition Plan The activities detailed in the plan will be incorporated into the IWCP package Attachment 2 contains best management practices for construction activities that can be used to develop facility specific practices

4.4 Health and Safety

Worker health and safety will be addressed on a project-specific basis through Health and Safety Plans (HASPs) The HASP defines mechanisms and procedures to identify, mitigate, and control/eliminate potential safety, health and environmental hazards associated with the demolition Job Hazard Analysis (JHAs) address specific hazards associated with demolition activities including hazards for each task step, controls to be used, special equipment needs, training, and any necessary monitoring The HASP also identifies required training requirements that individual workers will comply with for specific activities

No tasks will be performed until a JHA has been written and approved with the exception of walkdowns, general work tasks, surveillance, inspections, and other tasks specific by the project-specific Health and Safety Manager The project Health and Safety Manager, with radiological personnel, will assess the need for employee personnel and area monitoring

Work activities will be stopped if any unanticipated hazard is encountered or a known or potential hazard is present at a level exceeding established control limits, and appropriate notifications and mitigation of the hazard encountered will be pursued The IWCP process will be used to identify hazards, and the controls for those hazards will be included in the project-specific HASP The following bullets detail the health and safety actions and controls for respirable silica

- Exposure Limit – OSHA, TWA 0 05 mg/m^3 and ACGIH, TWA 0 05 mg/m^3
- Respiratory Protection – None <0 05 mg/m^3, ½ APR <0 5 mg/m^3, FF APR <2 5 mg/m^3, PAPR <5 mg/m^3, SA <50 mg/m^3
- Physical and Chemical Characteristics – soft, bulky solid materials
- Routes of Exposure – inhalation
- Exposure Symptoms – acute silicosis
- Additional Recommend PPE – Gloves, tyvek coveralls

The other hazards associated with demolition will be those of a typical construction site Those hazards do not have action levels and will be managed in accordance with the RFETS Health and Safety Program

4.5 Waste Management

Various waste types will be generated as a result of facility demolition activities Waste estimates for this and other RFETS Closure Project activities are contained in a database The principal output of the database is the "Waste Generation, Inventory, and Shipping Forecast," which includes projections for waste volumes to be generated, stored, and shipped from the Site in each fiscal year As individual closure projects progress, waste volume estimates are refined and updated on a quarterly basis, or more frequently if warranted by significant changes Project-specific waste management information is documented in a Waste Management Plan, which is prepared as an appendix to the Project Execution Plan (PMP)

All wastes generated during this phase of decommissioning will be designated remediation waste All waste covered by the requirements of the Consent Orders (i e waste chemicals, idle equipment, and mixed residues) and all wastes being managed under the Site Treatment Plan are expected to be removed prior to facility demolition Requirements and controls for their management are not included in this RSOP This section describes how the various wastes will be managed during the demolition phase of decommissioning

4.5.1 Waste Types

The following is a brief description of the various waste types that may be generated during facility demolition Sanitary waste is classified as routine (e g , normal office trash), (2) non-routine (e g , construction debris), and (3) special (e g , petroleum-contaminated media) Sanitary waste is collected for recycle or disposal at an approved off-site landfill (currently Front Range Landfill, Inc in Erie, Colorado, a Subtitle D-regulated facility) Special sanitary waste is

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identified to the Customer Services organization and Sanitary Waste Programs for specific requirements on a case-by-case basis

4.5.2 Waste Disposal

Wastes generated as a result of facility demolition will be packaged and characterized in compliance with RFETS waste management procedures, which implement disposal site WAC and U S Department of Transportation (DOT) packaging requirements Disposal locations will be selected based on the properties of the particular waste stream, and are discussed in the sections pertaining to the various waste types in Section 4 5 1

Off-site facilities accepting remediation waste from RFETS must have a Facility Use Decision (FUD) and meet the requirements of the CERCLA "off-site rule " The primary purpose of the "off-site rule" is to clarify and codify the CERCLA requirements to prevent waste generated from remediation activities conducted under a CERCLA action from contributing to present or future environmental problems at off-site waste management facilities Only facilities meeting EPA's acceptability criteria may be used for off-site management of remediation waste

4.5.3 Waste Minimization and Recycling

Waste minimization and recycling will be integrated into the planning and management of waste generated during facility demolition Unnecessary generation of sanitary wastes will be controlled using work techniques that prevent the contamination of areas and equipment and reusing tools and equipment, when practical

Standard decontamination operations and processes will be evaluated for waste minimization, and suitable minimization techniques will be implemented Property with radiological or chemical contamination may be reused or recycled on site, off site by other DOE facilities, or by publicly or privately owned facilities that have proper authorization for receiving such property

Recycling options that may be considered for wastes generated during facility component removal, size reduction, and decontamination activities are listed in Table 3 Materials will be recycled based on availability of appropriate recycle technologies, availability of approved facilities, and cost effectiveness

Table 3. Material Recycling Options

Waste Stream	Recycle Option	Comments
Clean scrap metal (not radioactively contaminated and not considered hazardous in accordance with RCRA)	Recycled through approved scrap metal vendors or via contract	Material must meet receiving facility's WAC
Clean building rubble/debris	Reuse on site as backfill	Must meet the criteria established in the RSOP for Recycling Concrete
Clean bulk plastics and glass	Recycled through approved commercial facilities	Material must not exceed contamination types and levels identified in the receiving facility's WAC
Used oil	Recycled through approved commercial fuel blending facilities	Material must meet receiving facility's WAC

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5. ENVIRONMENTAL CONSEQUENCES

RFCA mandates incorporation of National Environmental Policy Act (NEPA) values into decision documents (DOE 1996) Accordingly, this section addresses the potential environmental consequences of the activities needed to complete facility disposition (as specified in Section 4 2) The consequences or impacts are addressed by resource area, as listed below

- Section 5 1 Soils and Geology,
- Section 5 2 Air Quality,
- Section 5 3 Water Quality,
- Section 5 4 Human Health and Safety,
- Section 5 5 Ecological Resources,
- Section 5 6 Historic Resources,
- Section 5 7 Visual Resources,
- Section 5 8 Noise, and
- Section 5 9 Transportation

As a principle topic of concern, and as outlined in the RFCA, waste management is discussed separately in Section 4 5 Unavoidable impacts, cumulative impacts, and long-term impacts are also considered in this section As appropriate, guidelines or requirements that minimize or mitigate the impacts of proposed activities are provided in each section, as appropriate

This section analyzes impacts from disposition activities, and discusses how the impacts of disposition activities may be cumulative with impacts from other actions (e g , truck traffic associated with building disposition is combined with traffic from nearby gravel pit operations to evaluate the impact on nearby roads) Cumulative impacts are discussed in Section 5 10 Sections 5 11 addresses the short-term uses versus long-term productivity and Section 5 12 addresses irreversible and irretrievable commitments of resources, respectively

Some of the analyses in this section are based on bounding analyses taken from the *Cumulative Impacts Document* (CID) (DOE, 1997) The analyses presented in the CID consider impacts from the full scope of activities that are required to close the Site These activities include, for example, loading, packaging, storing, and transporting waste in all areas of the Site The CID analysis includes the total impacts of Site closure The impacts from building disposition are bounded by the total impacts of the closure, as documented in the CID

The environmental analysis indicates that impacts to environmental resources and human health and safety will be minimal, given implementation of mitigation measures Results of the impact estimates are summarized below, and discussed in detail in the following subsections Surface and subsurface soils will be disturbed throughout the developed portion of the Site, but activities will occur in previously disturbed and contaminated areas Building disposition is a prerequisite to environmental restoration and the cleanup of contaminated soils at building sites Air quality impacts will be related to particulate emissions, but emissions will be controlled by mitigation measures and will be short-term in duration Adverse impacts to water quality will be mitigated by erosion control measures and temporary protection of contaminated soil areas (lasting until environmental restoration is started) Risks to human health and safety will be greatest for workers, the risks will not be significant Public health and safety risks will be a small fraction of worker risk Ecological resource impacts will vary, with some species increasing and other species declining as a result of the action Historic resources have been documented and recorded, and no impact will occur to historic resources The appearance of the Site will change dramatically as buildings are removed, an open space appearance will result Noise effects will be temporary and insignificant The impacts of shipping will be temporary and minor

5.1 Soils and Geology

Soils throughout the Site would be disturbed by the proposed demolition activities At each facility, equipment will operate in and around the structure, using paved areas and roads as feasible, but may also traverse or operate from unpaved areas Most debris will be contained within or near the footprint of the facility, but some debris may be placed in stockpiles on nearby open areas

Soils at the Site have been studied through the Site's soil monitoring program, the background soil characterization program, and various remedial investigations, and mapped by the U S Soil Conservation Service Most soils in the developed portion of the Site are identified as Flatirons very cobbly to very stony sandy loams, which have a low permeability, slow runoff potential, and a slight wind and water erosion potential Less common soils in the developed area include Nederland and Denver-Kutch-Midway Nederland is a very cobbly, sandy loam, with moderate permeability, rapid runoff and severe water erosion potential (10-15% slopes), and slight wind erosion potential Denver-Kutch-Midway is a clay loam with a low permeability, rapid runoff and severe water erosion potential (5-25% slopes), and low to moderate wind erosion potential (DOE 1997) Most soils in the project area have been heavily modified or covered with paved surfaces, and do not retain their original soil properties

The greatest issue about soils at the Site is contamination In the past, some soils at the Site have been contaminated through waste disposal practices, accidental releases, and spills Potential contaminants include radionuclides, solvents, metals, acids, polychlorinated biphenyls, and fuel hydrocarbons

Since facility demolition activities will be conducted throughout developed portions of the Site, including areas with identified surface contamination, activities must be managed to avoid disturbing contaminated soils, or managed to contain and prevent further distribution of contaminated soils Clean demolitions will include the removal of building foundations to three feet below grade The demolition activities will not include remediation of contaminated soils, and therefore the contaminated soils will need to be protected until environmental restoration activities are started The protection may include measures such as covering the voids and exposed soils to prevent precipitation from reaching the contaminated areas, using covers or soil stabilizers to prevent contaminants from being dispersed as windborne particles, and fencing to keep people and animals out of the area These and other measures will be used as needed to prevent the release of contaminants

Uncontaminated soils will not be altered significantly during and following the demolition activities While soil erosion will not be prevalent, given the generally low erosion potentials and large paved areas, substantial amounts of small debris, dust, and fines may be generated during disposition activities These materials may remain after the larger pieces of debris have been removed, but the area will be cleaned to prevent wind or water from spreading the dust and to allow for eventual suitable site restoration Various control measures, such as silt fences, may also be implemented to control runoff from facility locations These controls will also be used where disturbed soils are prone to water erosion A listing of potential control measures is provided in Attachment 2

Although fuels, oils, and other solid or liquid materials used during demolition could be spilled, soils are not highly permeable, paved areas are largely impervious, and a spill control plan would be implemented by the Site Surface and subsurface soils will not likely be substantially affected by a spill

5.2 Air Quality

This analysis is primarily concerned with particulate emissions, since these pollutants are most likely to be generated by demolition activities The Site conducts continuous and extensive monitoring for radionuclide air pollutants Air emissions from Rocky Flats are within limits for all pollutants for which there are standards (DOE 1998b) Activities conducted during facility demolition will also be monitored on a continual basis, and air pollutant levels are expected to remain within established limits

Although this RSOP addresses the demolition of facilities that meet unrestricted release criteria, the Site standard is a maximum 10 mrem per year effective dose equivalent to any member of the public (as mandated by 40 CFR 61, Subpart H), which is monitored by the RAAMP network Fourteen of the network samplers, deployed at the Site perimeter, are used to demonstrate Site compliance with the standard Filters from the perimeter samplers, and from one sampler near the 903 Pad, are collected and analyzed monthly for uranium, plutonium, and americium isotopes

Areas with contamination (e g , exposed soils) that remain after demolition will need to be protected until environmental restoration activities are started The protection may include measures such as covering the voids and exposed soils to prevent contaminants from being dispersed as windborne particles, and fencing to keep people and animals out of the area These and other measures will be used as needed to prevent the release of contaminants

The EPA regulates six “criteria” pollutants ozone, carbon monoxide, nitrogen oxides, sulfur dioxide, fugitive dust, and lead The Site is located within the metropolitan Denver area in Air Quality Control Region No 36, which is designated as “nonattainment” with respect to the National Ambient Air Quality Standards (NAAQS) for particulate matter less than 10 micrometers in diameter (PM_{10}) and carbon monoxide (EPA 1999) The Region is in attainment for the other criteria pollutants (40 CFR 81 306)

Demolition activities will include operation of heavy equipment, vehicles, generator sets, and similar equipment Several pieces of equipment may be used at a facility, with operational hours limited according to the size and type of facility The emissions from equipment will not generate sufficient criteria emissions to affect NAAQS Temporary fossil fuel-fired equipment use (or fuel use) will need to be tracked to ensure that emissions remain within regulated amounts, or that appropriate notices or permit modifications are filed In addition, opacity rules will need to be followed (limiting opacity below a 20 percent standard) Demolition activities will generate dust, including both TSP and PM_{10}, that may be of concern, and each facility will have a control plan that provides for dust control (e g , covering facilities and stockpiles, spraying water)

Concentrations of TSP and PM_{10} are determined by five air monitoring stations at the Site property boundary operated by the Colorado Department of Public Health and Environment (CDPHE) These stations monitor for TSP and PM_{10} as well as other criteria pollutants Two of these stations are located just off-site at the northeast and southeast Site boundary along Indiana Street These samplers are operated for 24-hour periods on a rotating, every-sixth-day schedule to match the national EPA particulate sampling schedule These sampling locations are downwind of the Site and are representative of Site impacts Maximum concentrations of PM_{10} and TSP recorded at the CDPHE stations are considered the ambient off-site concentrations of these two criteria pollutants Monitoring by the stations will provide an ongoing record of ambient air quality, and will alert the Site if cumulative Site activities are impacting air quality (as related to particulates)

Hazardous air pollutants include a wide range of materials or chemicals (e g solvents) that are toxic or potentially harmful to human health Sources of HAPs, including asbestos, are to be removed prior to demolition activities A demolition notification must be filed with CDPHE certifying that the facility has been examined for asbestos The certification also provides verification that refrigerants or ozone depleting compounds (ODCs) have been removed

Details on meteorology, air quality, monitoring, and air emission controls at the Site can be found in the CID

5.3 Water Quality

Water quality at the Site could be affected by demolition activities Water quality, during demolition, subsequent stockpiling of facility debris, and due to the final condition of each facility site, could be adversely affected by runoff or seepage to groundwater following rain or snow events

An IWCP package will be prepared for facilities that are to be demolished, the package will address potential pollutant sources and the way in which the pollutant could reach surface waters, downstream basins, or ponds Berms, silt fences, or similar erosion control devices (see Attachment 2) may be used to prevent debris (e g , silt or contaminated soils) from being washed into surface water drainages Drains and other subsurface openings will be sealed or plugged prior to demolition, and debris will be loaded into covered roll-off containers, drums, or similar containers to prevent the loss of dust and debris Street sweepers will be used on roads to collect debris and dust spilled during the on-site transportation of the facility debris

Areas with contamination (e g , exposed soils) that remain after demolition will need to be protected until environmental restoration activities are started The protection may include measures such as covering the voids to prevent water ponding and potential seepage into groundwater Such measures will be used as necessary to prevent groundwater and surface water impacts

Demolition will also be restricted according to weather conditions, if high winds or severe rains occur, demolition activities will be postponed Surface water that is channeled from around facilities is sampled at surface water sampling locations downgradient from the facilities

After each facility or cluster has been demolished and facility debris and other wastes removed, the sites will again be inspected by the project team The final inspection will ensure that debris, materials, and dust at the site have been removed, and that the potential for future erosion is minimized Because these measures will prevent or mitigate the release of pollutants to surface waters, impacts to surface waters are likely to be minimal

5.4 Human Health and Safety

Physical hazards to workers involved in facility demolition are similar to the hazards found in comparable commercial demolition activities The CID reports a projection of 584 worker injury and illness cases in the year of highest closure activity at RFETS, cases specifically associated with facility demolition activities would be a fraction of the Site total

A project-specific Health and Safety Plan (HASP) and Job Hazard Analysis will be prepared on a facility or project-specific basis to identify and control potential hazards The HASPs will address both the specific hazards to be encountered and applicable guidance and requirements (e g , OSHA), as well as specific safety equipment (e g , hard hats, PPE) required for individual tasks The HASPs will also recognize the special risks and safety requirements associated with heavy equipment used in demolition and will provide procedures for site workers in the vicinity of such machinery Implementation of the requirements of these documents will minimize the possibility and potential consequences of accidents, and minimize physical hazards A security plan will also be developed for each such operation, and will address handling, storage, and use of the explosives

Potential threats to health and safety for collocated workers and the general public from the release of airborne materials will be mitigated via implementation of dust suppression techniques as described in Section 4 The use of controls and procedures for worker protection will also protect the public, since work control measures are designed to identify potential hazards and prevent (e g , by using dust controls) releases

The CID reports the following estimated annual radiological doses from Site closure activities maximally exposed collocated worker 5 4 mrem, maximally exposed member of the public 0 23

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mrem, population dose 23 person-rem The population dose would be expected to produce 0 012 latent cancer fatalities in the region of interest population of 2 7 million Since these estimates include **all** Site closure activities, impacts from activities addressed in this RSOP will be a small fraction of those reported above, especially given that the contamination will have been removed from facilities prior to demolition

5.5 Ecological Resources

Facility disposition will permanently affect local ecosystems In particular, various bird species (e g , swallows, finches) use the facilities for nesting sites, these nesting sites will be permanently lost Bird densities for certain species, especially barn swallows and cliff swallows, are expected to decline in the industrial area Mammals such as deer, rabbits, and mice also use the industrial area at times Although habitat for these mammals will be temporarily impacted by the demolition of the facilities, the long-term effects will be positive once native vegetation is restored in the industrial area The industrial area and supporting facilities do not currently support or provide habitat for threatened or endangered plant or animal species, or species of concern, nor do they contain unique or unusual biological resources

Wetlands exist in some portions of the industrial area, and demolition activities that could impact wetlands must be reviewed prior to initiating the action Downgradient wildlife habitat could also be damaged if soils or other eroded materials are allowed to flow into the habitats The use of silt fencing or other mitigative measures to prevent siltation will be used To minimize the possibility of adverse effects, and ensure that regulatory compliance is met, surveys of the potentially disturbed sites by Site ecologists will be conducted prior to any demolition activities

The industrial area will change from a densely built environment to an open environment with no structures, accompanied by a dramatic decrease in human activities Animal species will repopulate the area, with some species increasing, and other species declining (e g , due to a loss of suitable nest sites) Disturbed open areas will be revegetated Weed species may invade many open areas unless adequate weed control and reseeding of disturbed areas is provided

5.6 Historic Resources

During the Cold War Era, RFETS was one of only 13 nuclear weapons production sites in the United States In 1995, DOE conducted a survey of cultural resources in the Industrial Area and evaluated the Cold War Era resources using guidelines set forth by the Department of Interior (DOE 1995) Based on this survey, 64 facilities at the Site were determined highly important to regional, national, and international history for their role in the Cold War Era These 64 facilities were either primary contributors to the production of weapons or secondary contributors to the central mission of the Site, and functioned together to produce nuclear weapons during the Cold War

The State Historic Preservation Officer determined these facilities eligible for the National Register of Historic Places as an historic district The Rocky Flats Plant Historic District (site 5JF1227) was placed on the National Register of Historic Places on May 19, 1997 Documentation and preservation requirements are set forth in a Programmatic Agreement signed by the DOE Rocky Flats Field Office, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation

Facilities to be demolished include those facilities within the Rocky Flats Plant Historic District Prior to any alterations, documentation of the buildings' historical significance is required to comply with the Programmatic Agreement signed by the DOE Rocky Flats Field Office, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation The history of the Rocky Flats Plant, including all 64 buildings within the Historic District, has recently been documented in the *Historic American Engineering Record for the Rocky Flats Plant Historic District* (HAER-CO-83-T) (Kaiser-Hill 1999) Such documentation, consisting of a narrative report, engineering drawings and photographs, meets the requirements of the Programmatic Agreement and has been accepted by all responsible parties Since this documentation includes facilities that will be demolished, it effectively mitigates any adverse impacts to cultural resources associated with demolition

Minimal groundwork is anticipated (e g , installation of silt fences), and most work would occur on previously disturbed land Therefore, no impact to historic artifacts will occur Should any historic resource be identified during the project, work will be stopped and Site procedures regarding historic resources will be followed

5.7 Visual Resources

Project activities will completely change the landscape at the Site The removal of the facilities will permanently change the visual setting from an industrial setting to an open space setting The appearance of the Site will be close to the original prairie setting, although roads and paved areas will be left throughout the Site The change will be visible from public roads and areas around the Site during daylight hours At night, the existing man-made lighting will be gone, the setting will be congruent with undeveloped open space

During the demolition activities, cranes and other equipment may be visible from off-Site locations Dust generated during demolition may be temporarily visible, but would dissipate before leaving the Site as a visible cloud or plume of dust Control measures, such as watering, may be used if needed to control dust

5.8 Noise

Demolition activities will result in a temporary increase in local noise levels The increased noise will result from the demolition of the facilities, and the loading and hauling of the resultant debris The noise will generally be consistent with prior site construction and demolition activities (such as other heavy equipment operations)

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Most noise from the demolition will not include sudden, short, or unexpected noises However, if explosive demolition is used, sudden and high levels of noise can be expected Explosive demolition can be managed to restrict noise levels, but levels of 130 dB or more near the facility could be expected Proper preparation (e g , intercom announcements) of Site personnel to avoiding startling or panic reactions will be needed

Demolition operations will be conducted during the day, and noise will be attenuated by distance and obstructions For example, a front-end loader generates about 84 decibels (dB) at 50 feet (the threshold of hearing loss for prolonged exposure) At 1,600 feet, that noise will drop to about 54 dB (below the accepted level for residential land use) Vegetation, facilities, and terrain will further attenuate the noise Since the nearest public receptor is over 5,000 feet from either project site, noise generated by the project will be effectively confined to the Site Although public receptors will not be effected by most types of demolition noise, explosive demolition may be noted off-Site Notification of the public (e g , public announcements, informational postings along nearby roadways) may be necessary if high levels of explosive demolition are planned Appropriate hearing protection will be supplied for workers, as specified in the project HASP

5.9 Transportation

Disposition activities will produce wastes requiring disposal at off-site facilities, and transport to those facilities One of the most abundant materials resulting from facility disposition will be concrete Clean concrete will be reused on Site as fill, no off-Site transportation or impact is projected (Concrete Disposition RSOP, 1999) Sanitary waste (e g , scrap steel, wood, insulation, other construction debris) will be separated and shipped off-Site, these wastes are currently projected to be about 38 percent of the waste volume to be shipped off-Site during closure (LaHoud, 2000)

The low volume of daily truck traffic is not expected to significantly affect road traffic or safety, and transportation activities will not disproportionately impact minority and low-income populations However, the volume-to-capacity traffic ratios of Highway 93 and Indiana Avenue during peak traffic hours (both morning and afternoon) are rated as poor (Jefferson County, 2000) Traffic impacts can be reduced by scheduling truck traffic during off-peak hours (mid-morning to mid-afternoon)

The transportation effects of low level and low level mixed wastes are contained in Appendix 3 Although these wastes will not be generated during the demolition activities in the scope of this RSOP, the waste will be generated during facility disposition

5.10 Unavoidable And Cumulative Effects

Some temporary, adverse effects will necessarily occur because of the project activities Some small areas of surface soils will be compacted or otherwise modified Minor quantities of air pollutants will be released to the atmosphere Workers will experience health and safety risks that are typical of demolition projects Noise levels will increase slightly The facilities are a resource that will be permanently lost for other uses, and fuels and other resources will be consumed during the demolition

The proposed action is a key element of the overall mission to clean up the Site and make it safe for future uses The cumulative effects of this broader, Site-wide effort are described in the CID That document describes the short- and long-term effects from the overall Site clean-up mission Actions taken during facility disposition will be part of the overall process for closure of the Site, but disposition activities will usually result in discrete, short-term effects that will not be cumulative with effects resulting from other closure activities The principal cumulative effect of these activities and activities occurring under this RSOP will be the actual removal of the Site facilities

The collective effect of closure will be substantial at the Site and for the surrounding communities The appearance of the Site will dramatically change The disappearance of the facilities will be the most tangible evidence that the Site has been largely cleaned up, and that there is no possibility of production operations being re-instituted Activities at the Site will dramatically decline following the demolition of the Site's facilities, with associated declines in employment at the Site The cumulative effect is likely to be both beneficial (e g , surrounding properties may increase in value) and adverse (e g , a loss of employment generally affects nearby school enrollment) These impacts will be considered in future documents discussing closure and reuse of the Site

Cumulative effects of the facility demolition activities with other Site projects and projects in the vicinity of the Site will not be notable Temporary cumulative effects will include air emissions (e g , fugitive dust, exhaust emissions) and noise (e g , explosive demolition, vehicle noise) The increase in air emissions and noise will minimally add to pollutants and noise from off-Site activities

5.11 Short-term Uses Versus Long-term Productivity

The project area consists of the entire industrial area and nearby supporting structures Following demolition, the Site will no longer be a fully developed area, but will have the appearance of open space Because roads and other paved areas will remain, the long-term productivity of the land will not notably change If the land were eventually restored to its original condition as grassland, the long-term productivity of the land would change

5.12 Irreversible and Irretrievable Commitments of Resources

This project will irretrievably consume fuels, small quantities of other materials, water, money, and labor Resources originally used during the construction of the facilities will be irretrievably lost If the facilities were preserved or re-used, the consumption of these resources would be considerably increased

6. COMPLIANCE WITH ARARS

By the tıme a facılıty ıs scheduled to be demolıshed under the authorıty of thıs RSOP, decommıssıonıng actıvıtıes and a pre-demolıtıon survey wıll have been completed The pre-demolıtıon survey wıll eıther confirm that decommıssıonıng actıvıtıes are complete and the facılıty ıs ready for unrestrıcted release demolıtıon or that addıtıonal decommıssıonıng may be requıred Any facılıty that requıres addıtıonal decommıssıonıng, or contamınated demolıtıon, wıll be addressed by other decısıon documents As stated ın Sectıon 1, thıs RSOP wıll only be used for the demolıtıon of facılıtıes that meet the unrestrıcted release crıterıa

ARARs must be attaıned for hazardous substances, pollutants, or contamınants remaınıng on-sıte at the completıon of the remedıal actıon, unless waıver of an ARAR ıs justified and has been documented ın an approved decısıon document The ımplementatıon of remedıal actıons also requıres complıance wıth ARARs to protect publıc health and the envıronment Because each facılıty dıspostıoned under thıs RSOP has been determıned to meet the unrestrıcted release crıterıa, there are no chemıcal-specıfic ARARs addressıng hazardous substances, pollutants, or contamınants that may be remaınıng on-sıte Actıon-specıfic and locatıon-specıfic ARARs that are protectıve of publıc health and the envıronment durıng the ımplementatıon of demolıtıon actıvıtıes have been ıdentıfied by the RFCA Partıes and are summarızed ın Table 4

Sıxty-four facılıtıes of the former Rocky Flats Plant have been lısted ın the Natıonal Regıster of Hıstorıc Places as an hıstorıc dıstrıct These facılıtıes may be dısposıtıoned ın accordance wıth thıs RSOP ıf the facılıty ıs determıned to be clean after the pre-demolıtıon survey A Programmatıc Agreement wıth the Colorado State Hıstorıc Preservatıon Officer requıres that these sıxty-four facılıtıes be documented usıng the Hıstorıc Amerıcan Engıneerıng Record (HAER) format before the facılıtıes are sıgnıficantly altered or demolıshed The Natıonal Park Servıce accepted the HAER documentatıon for these sıxty-four facılıtıes ın the summer of 1998 Thıs documentatıon ıs located ın the RFETS Sıte-wıde Operable Unıt Admınıstratıve Record Fıle Sectıon 5 6 of thıs RSOP contaıns addıtıonal ınformatıon on the hıstorıc resources

Concrete, or buıldıng rubble, that has met unrestrıcted release crıterıa may be used as recyclable fill materıal on-sıte ın accordance wıth the RFCA Standard Operatıng Protocol for Recyclable Concrete approved on October 18, 1999 (Concrete RSOP) Any remaınıng sanıtary waste or sanıtary remedıatıon waste not dısposıtıoned ın accordance wıth the Concrete RSOP wıll be managed on-sıte as sanıtary waste and wıll be dısposıtıoned off-sıte at an approved sanıtary dısposal facılıty Potentıal off-sıte dısposal sıtes that may receıve sanıtary remedıatıon waste wıll be requıred to have CERCLA off-sıte rule approval from the approprıate EPA office Sectıon 4 5 of thıs RSOP contaıns addıtıonal ınformatıon on waste management

No ARARs were ıdentıfied for the protectıon of water or water qualıty durıng facılıty dısposıtıon However, potentıal future water ıssues are addressed ın sectıons Sectıon 4 0, ER Transıtıon, Table 2, and Sectıon 5 3

Table 4. ARARs

Requirement	Citation	Type	Comment
COLORADO AIR QUALITY CONTROL COMMISSION (CAQCC) REGULATIONS	5 CCR 1001		
* Emission Control Regulations for Particulates, Smokes, Carbon Monoxide, and Sulfur Oxides	5 CCR 1001-3 (CAQCC Reg. No 1)		
Smoke and Opacity	Section II A.1	A	Air pollutant emissions from stationary sources shall not exceed 20% opacity (emissions from fuel-fired pumps, generators, compressors, process vents/stacks, etc)
Fugitive Particulate Emissions	Section III D III D 2(b) Construction Activities III D 2(c) Storage and Handling III D 2(e) Haul Roads III D 2(f) Haul Trucks III D 2(h) Demolition Activities	A	Covered processes shall employ control measures and operating procedures that are technologically feasible and economically reasonable which reduce, prevent, and control fugitive particulate emissions (control plans)
* Air Pollutant Emission Notice (APEN) Construction Permits and Fees Operating Permits and Including the Prevention of Significant Deterioration	5 CCR 1001-5 (CAQCC Reg No 3)		Cumulative air pollutant emissions from the hauling of demolition debris and/or from portable diesel fuel-fired equipment utilized during demolition activities could trigger APEN and air permitting requirements
APEN Requirements	Part A, Section II	A	An APEN shall be filed with the CDPHE prior to construction, modification, or alteration of, or allowing emissions of air pollutants from any activity Certain activities are exempted from APEN requirements per the regulation
Construction Permits, Including Regulations for the Prevention of Significant Deterioration (PSD)	Part B		
- Construction Permits	Part B, Section III	A	Fuel- fired equipment (generators, compressors, etc) associated with these activities may require permitting.
Clean Air Act (CAA) [42 USC 7401 et.seq]			
Control of Hazardous Air Pollutants -Part B, The control of Asbestos	CAQCC Reg. No 9 [5 CCR 1001-10] Section III B 1 a (I)	A	A written notice of the intent to conduct demolition (regardless of whether asbestos is involved) or asbestos abatement must be submitted to the CDPHE, Air Pollution Control Division at least 10 working days before commencing demolition or an abatement project (form supplied by the CDPHE). A CDPHE Demolition Approval Notice must be received and posted prior to commencement of demolition activities

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Table 4. ARARs

Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
MIGRATORY BIRD TREATY [16 USC 701-715]			
• Taking, possession, transportation, sale, purchase, barter, exportation, and importation of wildlife and plants	50 CFR 10	A/L	Principally focuses on the taking and possession of birds protected under this regulation. Enforcement is predicated on location of the project and time of the year Current list of protected birds is kept with the Ecology group

7. RSOP ADMINISTRATION

This section contains the information associated with the implementation and documentation of the RSOP and the approval of the RSOP

7.1 Implementation Schedule

Once the regulatory agencies approve this RSOP, DOE may implement the RSOP throughout the duration of the Rocky Flats Closure Project No further formal approvals are required DOE will notify the LRA prior to implementing this RSOP for a specific project with a notification letter The notification letter will contain the following information

- The scope of the demolition project to include the facility number and brief facility description
- A reference to the RLCR
- Project-specific administrative record file index
- Deviations or exceptions to the RSOP
- Level one schedule for project implementation
- Points of contact for the project
- If a DOP must be prepared, only applies to Type 3 facilities

The LRA will have fourteen days to review the notification letter and provide feedback with respect to the project-specific administrative record file index If no feedback is received within fourteen days that documents the LRA exceptions to the notification letter, the project will proceed

Although no formal approvals are needed to implement this RSOP, the consultative process will be used throughout the project planning and development to ensure that the regulatory agencies and the public are aware of the status of the facility and the proposed path forward Specifically, the principles outlined in Section 1 1 1 of the DPP will be crucial throughout the facility disposition process, in order to implement this RSOP, the following principles will be maintained with respect to the facility disposition consultative process

- Timely sharing of information – Information sharing efforts may include but need not be limited to updates of the overall Site closure baseline, briefings on the development of work plans, briefings on changes to approved baselines, invitations to project status briefings, and consultations on decommissioning strategy
- Collaborative discussions of program changes – The goal of these collaborative discussions is to raise and resolve issues without delaying building disposition activities
- Designation and use of project points of contact for information exchange and resolution of issues – Each facility will have designated points of contact and the contacts will exchange information to ensure that everyone has the opportunity to be aware of the facility status and schedule It is anticipated that the interaction of these contacts will be primary means of exchanging project information

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- Respect for the roles and responsıbılıtıes of the partıes – Everyone on the project team wıll have desıgnated roles and responsıbılıtıes
- Traınıng – Traınıng may be necessary for all partıes to ensure that everyone understands the process and procedures and has the necessary access

7.2 Administrative Record

Thıs sectıon ıdentıfies the documents that constıtute the admınıstratıve record for thıs decısıon After completıon of the publıc comment penod, all comments receıved from the publıc, the responsıveness summary, and the approval letter wıll be ıncorporated ın to the admınıstratıve record Approval of thıs RFCA decısıon document ıs approval by the LRA of the RSOP's admınıstratıve record The followıng documents constıtute the admınıstratıve record

- RSOP Approval Letter
- Responsıveness Summary
- Draft RSOP for publıc comment
- Request for approval from DOE to CDPHE and EPA
- Halberstadt, Hans, 1996 *Demolıtıon Equıpment*, Motorbooks Internatıonal Publıshers and Wholesalers
- Betonamıt Technıcal Manual, Rımrock Explosıves, Hayden Lake, ID
- *The RFETS Decontamınatıon and Decommıssıonıng Characterızatıon Protocol*, MAN-077-DDCP
- *Decommıssıonıng Program Plan*, dated October 8, 1998 and approved November 12, 1998
- *Facılıty Dısposıtıon Program Manual*, MAN-076-FDPM
- *Control and Dısposıtıon of Incıdental Waters*, 1-C91-EPR-SW 01
- *RFETS Integrated Monıtorıng Plan*
- *Facılıty Assessment for the Industrıal Area Reuse Study*, RFETS, December 8, 1997, Hıggınbotham/Brıggs and Assocıates
- DOE 1998b U S Department of Energy Search Sıte docs Golden, Colorado June 10
- DOE 1997 U S Department of Energy *Rocky Flats Envıronmental Technology Sıte Cumulatıve Impacts Document* Golden, Colorado June 10
- DOE 1996 U S Department of Energy, Colorado Department of Publıc Health and Envıronment, and U S Envıronmental Protectıon Agency *Fınal Rocky Flats Cleanup Agreement* Golden, Colorado July 19
- DOE 1995 U S Department of Energy *Fınal Cultural Resources Survey Report, Rocky Flats Envıronmental Technology Sıte, The Industrıal Area* Prepared by Scıence Applıcatıons Internatıonal Corporatıon Golden, Colorado October
- EPA 1999 U S Envıronmental Protectıon Agency *The Green Book, Nonattaınment Areas for Crıterıa Pollutants* May (http //www epa gov/oar/oaqps/greenbk)
- Kaıser-Hıll 1999 *Hıstorıc Amerıcan Engıneerıng Record (HAER-CO-83) for the Rocky Flats Plant Hıstorıc Dıstrıct* Golden, Colorado Aprıl 19
- DOE 1998a U S Department of Energy *Radıonuclıde Aır Emıssıons Annual Report* Rocky Flats Envıronmental Technology Sıte Golden, Colorado

- Jefferson County, 2000 Jefferson County, CO websıte March 29 http //www co jefferson co us/
- Concrete Dısposıtıon RSOP, 1999 *RFCA Standard Operatıng Protocol for Recyclıng Concrete* Department of Energy, Rocky Flats Envıronmental Technology Sıte
- LaHoud, 2000 *Waste Generatıon, Inventory and Shıppıng Forecast, January 27, 2000* Communıcatıon from R LaHoud March, 2000

The notıficatıon letters for projects ımplementıng the RSOP wıll be contaıned ın the project's admınıstratıve record

7.3 Responsiveness Summary

The responsıveness summary addressıng publıc comments wıll be attached to the final approved RSOP

ATTACHMENT 1 RFETS FACILITY SUMMARY TABLE

This attachment provides a summary of the facilities by cluster with the associated square footage and anticipated facility typing

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
111 Cluster	111, general staff administration	44,046	1	
	T111A, offices	1,960		
	T115A, offices	6,860		
	T115B, offices	756		
	T115C, offices	3,000		
	116, DOE offices	16,700		
	T117A, offices	15,400		
	T119A, DOE/CDPHE offices	1,755		
	T119B, offices	15,400		
	T121A, offices	1,960		
	111B, guard post	N/A		
125/441 Cluster	441, offices	17,790	2	
	122S, paper shredder/utilities shed	222	1	
	125, standards laboratory	12,900		
	S125, storage shed	N/A		
	126, source storage	450		
	T441A, offices	2,080		
	Tank 079, liquid nitrogen storage	N/A	1	
	Tank 278, compressed air	N/A		
130 Cluster	130, plant engineering offices and warehouse	88 864	1	
	C130, storage yard container	378		
	T130A, offices	15,400		
	T130B, offices	15,400		
	T130C, offices	15,400		
	T130D, offices	15,400		
	T130E, offices	15,400		
	T130F, offices	15,400		
	T130G, offices	15,400		
	T130H, offices	15,400		
	T130I, offices	15,400		
	T130J, offices	15,400		
	131, offices	22,000		
	T131A, offices	1,960		
	132, electrical substation #9	1,180		
	130SY, maintenance storage yard	N/A		
223 Cluster	223, nitrogen supply facility	3,500	1	Cluster is located over an IHSS
	223A, ERM storage facility	200		
	552, bottled gas storage building	4,170		
	Tanks 17 and 22, molecular sieve absorber	N/A	1	

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
300/500 Cluster	S551, materials shelter	N/A	2	Portions of cluster are located over an IHSS
	334, general shop	42,950	1	
	549, RCT shop and offices	1,920		
	553, welding shop	1,280		
	554, storage and shipping dock building	1,190		
	556, metal cutting building	640		
	333, paint shop and sand blast	3,060		
	T334B, offices	1,960		
	T334C, offices	1,440		
	T334D, offices	600		
	T551A, offices	3,360		
	Tank 106, driox argon storage	N/A	1	
	Tank 108, air compressor	N/A		
	Tank 109, liquid nitrogen storage	N/A		
	Tank 161, Freon 12 accumulator	N/A		
331 Cluster	331, garage and fire station	23,540	1	Portions of cluster are located over an IHSS
	331A, storage	116		
	331F, fuel shelter	54		
	331S, storage shed	563		
	C331, storage	190		
	T331A, trailer (barracks)	560		
	335, fire training building	2,160		
	S372, bus stop/car pool shelter	N/A		
	Tank 035, ethanol	N/A	1	
	Tanks 038 and 041, diesel	N/A		
	Tanks 042 and 044, unleaded gasoline	N/A		
	Tank 100, propane storage	N/A		
	Tank 101-102, diesel blend storage	N/A		
	Tank 103-104, gasoline storage	N/A		
	Tank 115, propane storage	N/A		
	TK-5A, TK-5B, and TK-6A UST diesel blend storage	N/A		
	TK-7A and TK-8A, UST gasoline	N/A		
371/374 Cluster	371, plutonium recovery building	315,022	3	110 gloveboxes in 371
	374, process waste treatment facility	43,636	2	
	378, waste collection pump house	130		
	262, diesel tank	2,129	1	
	373, cooling towers and pump house	3,200		
	377, air compressor building	120		
	381, fluorine storage building	1,320		
	374A, 371-374 carpenter shop	800		
	Tanks 163-164, product water tank	N/A	1	
	Tank 165, cement silo	N/A		
	Tank 166, liquid argon	N/A		
	Tank 167, nitric acid storage	N/A		
	Tanks 168-169, KOH storage	N/A		
	Tank 170, liquid nitrogen storage	N/A		
	Tanks 224-227, water and NaOH storage	N/A		
	Tank 228, spray dryer tank	N/A		
	TK-4A, aboveground diesel storage	N/A		
371A Cluster	376, offices	3,000	1	
	T371H, offices	720		
	T371J, offices	1,440		
	T371K, offices	1,440		
	T376A, offices	1,960		

Included For Information Only

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Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
371T Cluster	367, storage shed and road maintenance	3,000	1	
	T371A, offices	2,080		
	T371C, offices	11,400		
	T371D, offices	1,960		
	T371E, restrooms	240		
	T371F, offices	1,960		
440 Cluster	440, waste storage and repackaging	34,320	2	Portions of cluster are located over an IHSS
	439, mod center machine shop	5,140	1	
	T439A, offices	600		
	T439D, offices	1,440		
442/452 Cluster	T428B, tool shed	360	13	Portions of cluster are located over an IHSS
	442, HEPA filter test laboratory and warehouse	16,740		
	T442A, offices	520		
	452, offices	6,000		
	T452A, offices	1,440		
	T452B, offices	1,440		
	T452C, offices	1,440		
	T452D, offices	1,440		
	T452E, restrooms	80		
	T452F, offices	1,440		
	T452G, respirator fit facility	1,440		
	S444, bus stop and car pool shelter	N/A		
	S452, storage	N/A		
444 Cluster	444, manufacturing building	161,980	2	Portions of cluster are located over an IHSS
	447, manufacturing building	23,100		
	448, U material storage	3,614		
	450, filter plenum building	200		
	451, filter plenum building	2,760		
	455, filter plenum building	1,800		
	427, emergency generator building	312	1	
	445, carbon storage	3,273		
	449, oil and paint storage	240		
	453, oil storage	384		
	454, cooling tower	375		
	457, cooling tower	225		
	427A, fuel storage tank	200		
	449A, RMRS maintenance annex	N/A		
	449C, maintenance carpenter shop	N/A		
	S449, maintenance storage	N/A		
	Tank 64, propane storage	N/A	1	
	Tanks 66-67, liquid nitrogen storage	N/A		
	Tank 69, liquid argon storage	N/A		
	Tank 70, liquid nitrogen storage	N/A		

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
460 Cluster	460, offices (former non-nuc mfg building) T124A, DOE offices S460, bus shelter	212,980 15,400 72	1	
	462, cooling tower	589	1	
	Tanks 057 and 059, liquid nitrogen storage Tank 058, DRIOX argon storage Tank 289, UST diesel Tanks 356-366, chemical waste storage	N/A N/A N/A N/A	1	
300/500 Cluster	551, general warehouse and contractor shop	44,140	2	Cluster is located over an IHSS
559 Cluster	559, plutonium analytical laboratory	30,600	3	Portions of cluster are located over an IHSS
	561, filter plenum building 528, process waste pit	5,479 630	2	
	562, emergency generator building 564, offices 560, cooling tower 563, cooling tower	384 3,000 400 250	1	
	559A, 559 accountability board shelter 559-TUN, 559-561 tunnel	N/A N/A	1	
	Tank 128, liquid nitrogen storage Tank 129, liquid argon storage Tank 130-131, UST diesel storage TK-14 and TK-15, AST diesel storage	N/A N/A N/A N/A	1	
566 Cluster	566, protective clothing decon facility 566A, protective clothing plenum	13,700 4,000	2	Cluster is located over an IHSS
	566B, carpenter shop/storage shed	480	1	
	Tank 132, diesel tank	N/A		
569 Cluster	569, crate counter and waste storage facility 570, filter plenum	7,620 683	2	
664 Cluster	664, waste storage and shipping facility 666, TSCA storage building 668, drum storage and certification	13,730 1,584 1,540	2	Portions are over an IHSS
	T664A, offices C664, waste storage yard	4,392 N/A	1	
690T Cluster	663, storage and shipping building	4,446	2	
	662, plant power warehouse and offices T690N, offices	2,600 2,940	1	
	Tank 036, diesel storage Tank 037, propane storage	N/A N/A	1	

Included For Information Only

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
707 Cluster	707, PU manufacturing building	196,930	3	Cluster is located over an IHSS
	731, process waste pit (707)	506	2	
	708, compressor building	7,460	1	172 gloveboxes in 707
	711, cooling tower	1,900		
	711A, cooling tower emergency diesel pump	2,040		
	718, service building	294		
	707T, tomographic gamma scanner system trailer	N/A		
	708S, skid-mounted breathing air compressor	N/A		
	Tank 206, carbon tetrachloride storage	N/A	1	
	Tank 208, liquid argon storage	N/A		
	Tanks 209-221, helium storage	N/A		
	Tank 223, liquid nitrogen storage	N/A		
	Tank 284, helium storage	N/A		
	Tank 290, UST diesel blend	N/A		
	Tanks 324-325, diesel storage	N/A		
	Tank TK-16, AST diesel storage	N/A		
750 Cluster	705, coating laboratory	3,700	2	Portions of cluster are over an IHSS
	S750, custodial storage closet east end of T750B	N/A		
	706, library and office	4,000	1	
	T706A, offices	1,440		
	T707B, offices	520		
	T707S, flammable liquids storage	N/A		
	709, cooling tower	1,900		
	709A, emergency generator/pump	300		
	750, offices and cafeteria	57,170		
	T750A, offices	1,440		
	T750B, office and computer based training	720		
	T750C, offices	720		
	T750D, offices	1,960		
	K750, kiosk	160		
	763, PA breezeway	3,160		
	T779A, offices	1,440		
	Tank 205, liquid nitrogen storage	N/A	1	
750HAZ Cluster	551PAD, waste storage pad	N/A	1	Portions of cluster are over an IHSS
	750HAZ, main hazardous waste storage facility	N/A		
	S374, building 374 storage	N/A		
750PAD Cluster	Tent 2, mixed waste storage	9,000	2	
	Tent 3, mixed waste storage	10,500		
	Tent 4, mixed waste storage	10,800		Tent 5 contains a permacon facilities for repackaging LLW containers
	Tent 5, mixed waste storage	10,800		
	Tent 6, mixed waste storage	21,600		
	Tent 12, pondcrete storage	16,200		
	750-DP, 750 Pad Decon Pad	N/A	1	
	750P, propane tank farm (8 tanks)	N/A		
	T750F, locker trailer	980		
	T750G, break trailer	980		
	Tank 117, storage	N/A		

Included For Information Only

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
771/774 Cluster	771, plutonium recovery facility	151,430	3	207 gloveboxes in 771 Portions of cluster are over an IHSS
	771C, nuclear waste packaging/drum counting	4,648	2	
	774, liquid waste treatment plant	25,060		
	207, building 774 untreated waste storage tank	7,303		
	728, process waste pit (771)	101		
	714, HF acid storage	182	1	
	714A, HF gas storage	192		
	714B, emergency breathing air	192		
	715, emergency generator #1	824		
	716, emergency generator #2	286		
	717, magnehelic gauge	48		
	K771, kiosk east of T771B	160		
	772, fluorine storage	1,129		
	772A, acid storage	400		
	774A, steam condensate holding tank	363		
	774B, steam condensate holding tank	363		
	775, sewage lift station	152		
	S770, storage building	N/A		
	771S, 771 stack	N/A	1	
	Tank 179, propane storage	N/A	1	
	Tank 174, liquid argon storage	N/A		
	Tank 175, liquid nitrogen	N/A		
	Tank 176, NaOH storage	N/A		
	Tank 180, cooling water storage	N/A		
	Tanks 182-184, underground, out of service	N/A		
	Tank 185, KOH storage	N/A		
	Tanks 192-193, underground diesel storage	N/A		
	Tanks 194-195, hydrofluoric storage	N/A		
	Tanks 292-293, underground firewater collection	N/A		
	T21A, aboveground diesel storage	N/A		
771A Cluster	771-DT, decon trailer	N/A	2	Portions of cluster are over an IHSS
	770, maintenance action center/storage	2,860	1	
	771B, carpenter shop	564		
	T771A, offices	1,620		
	T771B, offices	1,440		
	T771C, offices	520		
	T771D, offices	520		
	T771E, offices	1,440		
	T771F, offices	1,960		
	T771G, offices	1,200		
	T771H, offices	1,440		
	T771J, offices	1,960		
	T771K, offices	1,960		
	T771L, restrooms	320		
	T771MB, training break room	480		
	T771N, construction material tool storage	288		
	Tank 197, propane storage	100		

Included For Information Only

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
776/777 Cluster	776, MFG building	156,200	3	64 gloveboxes in 776
	777, assembly building	74,820		
	730, process waste pit (776)	900	2	297 gloveboxes in 777
	701, waste management R&D	5,177	1	
	702, pumphouse	980		Portions of cluster are over an IHSS
	703, pumphouse	1,140		
	712, cooling tower	2,900		
	712A, natural gas building	100		
	713, cooling tower	2,900		
	713A, valve pit	100		
	776A, air compressor	N/A		
	781, air compressor building	270		
	771-TUN, 771-776 tunnel	N/A		
	Tank 199, liquid nitrogen storage	N/A	1	
	Tank 200, liquid argon storage	N/A		
	Tank 202, diesel storage	N/A		
	Tank 201, breathing air tank	N/A		
	Tank 203, water/coolant storage	N/A		
	Tank 207, liquid argon storage	N/A		
	Tank 244, underground storage	N/A		
	Tank 245, underground diesel	N/A		
	TK-23, aboveground diesel	N/A		
778 Cluster	778, service building, lockers and maintenance shop	31,200	2	Cluster is located over an IHSS
	732, laundry waste pit (778)	76		
790 Cluster	790, radiation calibration laboratory	6,768	1	
800A Cluster	884, waste storage	3,220	2	Portions of cluster are over an IHSS
	830, storage/isolated power supply	384	1	
	885, maintenance/paint and oil storage	960		
	890, pump house	1,361		
	T881A, offices	980		
	T881B, offices	720		
	T883A, offices	1,960		
	T883B, offices	1,960		
	T883C, office	1,960		
	T883D, restrooms	200		
850	850, Offices	39,894	1	

Included For Information Only

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
881 Cluster	881, manufacturing and general support 881F, filter plenum building 887, sewage and process waste pumping	245,160 8,467 1,555	2	Portions of cluster are over an IHSS
	881C, cooling tower 881G, emergency generator building 881H, electrical equipment 881-S1, 881-883 stack, northwest 881-S2, 881-883 stack, northeast 881-S3, 881-883 stack, south 881-TUN, 881-883 tunnel	452 1,075 1,960 N/A N/A N/A N/A	1	
	Tank 013, underground concrete foundation drain tank Tank 016, underground foundation sump tank	N/A N/A	2	
	Tank 002, UST diesel storage Tank 014, liquid nitrogen storage Tank 015, driox argon storage Tank 029, helium storage tank TK-66, AST diesel storage	N/A N/A N/A N/A N/A	1	
865 Cluster	865, material and process development lab 866, process waste transfer building 867, filter plenum building 868, filter plenum building	38,250 418 2,809 2,133	2	Portions of cluster are located over an IHSS
	827, emergency generator building C865, cooling tower 863, electrical transformer building	384 300 400	1	
883 Cluster	879, filter plenum building 883, rolling and forming facility	3,640 60,500	2	Portions of cluster are located over an IHSS
	883C, cooling tower S865, carpenter shop	452 N/A	1	
	Tanks 010-011, UST diesel Tank 012, liquid argon storage Tanks 020 and 021, nitric acid Tank 024, propane storage Tank 026, carbon dioxide storage Tank 252, liquid argon storage Tank 323, carbon dioxide storage TK-25, AST diesel storage	N/A N/A N/A N/A N/A N/A N/A N/A	1	
886 Cluster	828, process waste pit (886) 875, filter plenum building 886, nuclear safety/criticality facility	283 3,297 10,785	2	Portions of cluster are located over an IHSS 3 gloveboxes in 886
	880, storage building T886A, office 888A, electrical substation	800 1,960 384	1	
	Tank 039, underground U contaminated wastewater	N/A	2	
	Tank 040, storage Tank 294, storage	N/A N/A	1	

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Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
891T Cluster	T301, ER lab	126	1	Portions of cluster are over an IHSS
	T886B, offices	6,000		
	T886C, offices	2,000		
	T891B, offices	980		
	T891C, offices	3,920		
	T891D, offices	720		
	T891E, offices	1,440		
	T891F, offices	720		
	T891G, offices	720		
	T891O, offices	2,800		
	T891P, offices	720		
	T891Q, restrooms	768		
	T891R, offices	2,880		
	T891V, offices	720		
	T893A, offices	15,400		
	T893B, offices	15,400		
910 Cluster	215D, evaporation distillate storage tank	6,813	1	
	226, NaCl brine storage tank	473		
	227, nitric acid storage tank	326		
	228A, drying bed	1,105		
	228B, drying bed	1,105		
	910, reverse osmosis - evaporator	9,563		
	Tank 143, storage 450-05A	N/A	1	
	Tank 144, underground storage D-15	N/A		
	Tank 336, EDTA storage	N/A		
903/905 Cluster	903A, ER decontamination pad	1,000	2	Portions of cluster are over an IHSS
	966, PA decon pad	4,000		
	903A2, ER decontamination pad storage	N/A		
	903B, decon pad sedimentation tanks	N/A		
	903PAD, contamination barrier/pad	N/A		
	952, isolated toxic gas storage building	N/A	1	
	903A1, support building adjacent to ER decon Pad	N/A		
	Tanks 262-266, decontamination water storage	N/A	2	
	Tank 268, decontamination sediment/water storage	N/A		
	Tank 346, decontamination sediment/water storage	N/A		
	Tank 347, decontamination water storage	N/A		
	Tank 348, decontamination sediment/water	N/A		
	Tank 349, diesel storage	N/A		
904/906 Cluster	906, central waste storage facility	25,000	2	Tents 10 and 11 contain permacon facilities for repackaging LLW containers
	Tents 7, 8, 9, 10, and 11, pondcrete storage	81,000		
	T760A, shower trailer	160		
	902PAD, sludge storage pad	N/A		
	904PAD, sludge storage pad	N/A		
	904P, propane tank farm (8 tanks)	N/A	1	Portions of cluster are located over an IHSS
	760B, bus stop/carpool shelter	400		
	T904A, break trailer	400		
	Tank 237, propane storage	N/A	2	
	Tanks 269, 271-273, decontamination water storage	N/A		
	Tanks 274-275, decontamination sediment water	N/A		
	Tanks 359-360, wastewater storage	N/A		
	Tank 364, decontamination water storage	N/A		

Included For Information Only

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
964 Cluster	964, waste storage building	5,000	2	Cluster is located over an IHSS
991 Cluster	991, product warehouse 996, storage vault 997, storage vault 998, storage vault 999, storage vault 991TUN, tunnels between 991 cluster buildings	37,880 7,200 6,780 2,640 4,420 N/A	2	Portions of cluster are located over an IHSS
	984, shipping container storage facility 985, filter plenum building 989, emergency generator building	3,200 2,400 384	1	
	Tank 334, met lab tank water storage	N/A	2	
	Tank 149, liquid waste chromium storage Tank 150, glycol storage Tank 151, diesel storage TK-33, diesel storage	N/A N/A N/A N/A	1	
AIRMON Cluster	19 on-site monitoring stations	N/A	1	
H2OSIZ Cluster	930, effluent monitor station 931, effluent monitor station	57 57	1	Portions of cluster are over an IHSS
H20GIZ Cluster	891, groundwater treatment facility T900A, groundwater treatment trailer T900B, groundwater treatment trailer T900E, groundwater treatment trailer	3,000 384 384 384	1	
	Tanks 20–22, sulfuric acid	N/A	2	
	Tank 891-T-200, untreated water storage Tanks 891-T-201-202, influent equalization Tank 891-T-203, ion exchange Tank 891-T-204, clean water tank Tanks 891-T-205-207, treated groundwater	N/A N/A N/A N/A N/A	1	
H20SBZ Cluster	Tent 14, A-4 pond storage tank 306, Walnut Creek water sampling station 932, Pond A-1 effluent monitoring station 933, Indiana/Walnut Creek effluent monitoring station 934, Woman Creek effluent monitoring station 994, Pond B-4 effluent monitoring station	9,000 100 57 79 57 70	1	Walnut Creek station is located over/in an IHSS
	Tank 331, diesel blend storage Tanks 332-333, propane storage Tanks 362-363, cycled water storage	N/A N/A N/A	1	
HSOGBZ Cluster	308B, interceptor trench pump house 308B-A, ITS waste storage tank-341 308B-B, ITS waste storage tank-343 308B-C, ITS waste storage tank-344	64 10,297 10,297 10,297	2	Pipelines are located over/in an IHSS
	T900C, groundwater treatment trailer T900D, offices 900ATM, CFFCU automated teller machine ITSP, interceptor trench system pipelines	384 600 N/A N/A	1	
	Tank 330, diesel blend storage tank	N/A	1	

Included For Information Only

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
INFELI Cluster	212, electrical distribution system 214, fence and street lighting 661, electrical substation 675, electrical substation 679, electrical substation 680, electrical substation 681, electrical substation building	N/A N A 1,160 1,150 500 500 2,302	1	
INFELN Cluster	515, electrical substation #5 516, electrical substation #6 517, electrical substation #7 518, electrical substation #8 520, substations 517-518 switchgear building 575, electrical power station	410 660 80 410 1,020 960	1	Portions of cluster are located over an IHSS
INFFCM Cluster	T122A, mobile decontamination system trailer	320	2	
	112, telecom center and offices 115, offices and EOC 122, medical/occupational health 220, telephone and communication system 222, data line system T566C, telecom portable facility T880C, telecom portable facility	9,280 16,964 8,600 N/A N/A N/A N/A	1	
	Tank 280, liquid nitrogen storage	N/A	1	
INFGAS Cluster	869, natural gas meter house 210, natural gas distribution system	420 N/A	1	
	Tank 030, underground pressure tank	N A	1	
INFLFN Cluster	217, new sanitary landfill 280, sanitary landfill support facility 281, sanitary landfill leachate valve building 282, landfill FP building and 120,00 gallon water tank 283, sanitary landfill evaporation pond 284, landfill leachate collection and storage S281, sanitary landfill bale storage	N A 8,134 80 1,284 N A N/A 450	1	
INFMT Cluster	180, meteorological data collection tower 181, meteorological data collection tower	100 100	1	

Included For Information Only

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
INFSEW Cluster	208, sanitary sewer system	N/A	1	Portions of cluster are over an IHSS
	209, storm drainage system	N/A		
	971, sludge drying bed	1,460		
	972, sludge drying bed	1,460		
	973, sludge drying bed	1,460		
	974, sludge drying bed	1,460		
	975, sludge drying bed	2,000		
	976, sludge drying bed	1,460		
	977, sludge drying bed	1,064		
	T974A, treatment trailer	110		
	988, tertiary treatment pump house	218		
	990, pre-aeration building	222		
	990A, wastewater treatment	200		
	995, sewage treatment facility	6,000		
	995-C-1 through 5, sewage treatment clarifiers	N/A	2	
	995-CCC-1 and 2, sewage treatment chlorine contact chambers	N/A		
	99501 and 99502, sewage treatment digestors	N/A		
	995-ECI 1, 2, 3, sewage treatment effluent tank	N/A		
	995-IC 1, 2, 3, sewage treatment influent tanks	N/A		
	995-AB-1 and 2, sewage treatment aeration basins	N/A		
	988A, ultraviolet disinfection	N/A		
	Tanks 238-240, STP effluent sand filter	N/A	1	
INFSTM Cluster	211, steam distribution	N/A	1	
	240, steam condensate storage tank-073	7,030		
	443, heating plant	18,606		
	710, steam valve house	540		
	S443, 443 storage shed	N/A		
	Tanks 025 and 027, fuel oil storage	N/A	1	
	Tanks 028 and 031, diesel storage	N/A		
	Tanks 090 and 091, UST diesel storage	N/A		
	Tanks 092-095, UST No 6 fuel oil	N/A		
	Tank 096, sulfuric acid storage	N/A		
	Tank 097, NaOH storage	N/A		
	Tank 098, boiler blowdown tank	N/A		
	TK-9A and TK-13A, diesel storage	N/A		
INFWTI Cluster	124, water treatment plant	8,308	1	
	129, water treatment, raw water strainer	228		
	215A, domestic water storage	2,000		
	215B, domestic water storage	2,000		
	206, domestic water	N/A		
	216, raw water supply and pump house	N/A		
	fire hydrants	N/A		
	Tanks 087-088, underground concrete settling beds	N/A	1	
	Tanks 279 and 281, under concrete sump tanks	N/A		
	TK-2A, aboveground diesel	N/A		
INFWTN Cluster	215C, domestic water storage	2,000	1	
	928, fire water pump house	1,255		
	Tank 140, #2 fuel oil	N/A	1	
PU&D Cluster	T303C, offices	200	1	
	NSY, North Storage Yards	N/A		
	PU&D, PU&D Yard	N/A		

Included For Information Only

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
PWTS Cluster	231, process waste holding tank 231A, process waste holding tank 231B, process waste holding tank 428, waste collection tank and pump house 429, underground process waste pit OPWLT, old process waste lines and tanks Tank 2, underground process waste vault	265 6,225 15,159 265 105 N/A 441	2	Portions of cluster are over an IHSS
	VV011-VV020, process waste valve vaults	N/A	2	
	Tank 76, process waste tank	N/A	2	
PWTSN Cluster	VV001-VV010, process waste valve vaults	N/A	2	Cluster is over an IHSS
	Tanks 018-019, UST process waste tank Tanks 304-306, UST process waste storage Tanks 312-313, UST process waste sump	N/A N/A N/A	1	
SECBZI Cluster	303, live fire range	N/A	2	
	T303D, offices (shooting range) T303E, offices (shooting range) 302, shoot house 308, compressor building	1960 212 N/A N/A	1	
SECBZO Cluster	120, guard post 920, guard post S120, bus stop/carpool	560 560 N/A	1	
	Tanks 43 and 247, septic tank Tanks 243 and 287, abandoned storage tank Tanks 318-319, diesel blend storage TK-1A and TK-32A, aboveground diesel tanks	N/A N/A N/A N/A	1	
SECIZ Cluster	119, security repair and fitness 121, security command center 127, emergency generator building 128, vehicle shelter, plant protection 864, guard post 987, storage vault, plant protection 993, security storage	11,200 6,530 504 2,448 1,160 182 1,200	1	Portions of cluster are over an IHSS
	Tanks 288 and TK-3A, diesel blend	N/A	1	

Facility Designation	RFETS Facility Number	Square Footage	Anticipated Facility Typing	Miscellaneous Site Information
SECNPZ Cluster	213, protection alarm and communication system	N/A	1	Portions of cluster are located over an IHSS
	260, perimeter security zone	48,000		
	372, guard post, portal 2	520		
	372A, personnel access control (PACS-2)	1,800		
	375, guard tower T-4	334		
	519, alarm systems storage	1,020		
	550, guard tower	338		
	557, guard post	310		
	705T, temporary guard post	N/A		
	706T, temporary guard post	N/A		
	761, guard tower	338		
	762, guard tower	368		
	762A, personnel access control (PACS-1)	2,351		
	764, PIDAS data collection building	1,763		
	765, secondary alarm center	960		
	765A, radio tower	1,000		
	773, Guard Post	190		
	773S, skid mounted guard post	N/A		
	792, guard post, portal 3	288		
	792A, personnel access control (PACS-3)	1,800		
	888, guard post	624		
	901, guard tower	338		
	992, guard post	370		
	Tanks 152, 154 and 162 propane storage	N/A	1	
	Tanks 153, 155, and 235 diesel storage	N/A		
	Tank 230, glycol storage	N/A		

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Attachment 2 Surface Water Management Practices

This attachment can be used to develop project specific surface water management controls for demolition projects The selected controls will be coordinated and concurred to by K-H surface water and Ecology

INTERCEPTOR SWALE

Description

An interceptor swale is a small v-shaped or parabolic channel, which collects runoff and directs it to a desired location It can either have a natural grass lining or, depending on slope and design velocity, a protective lining of erosion matting, stone, or concrete

Primary Use

The interceptor swale can either be used to direct sediment laden flow from disturbed areas into a controlled outlet or to direct clean runoff around disturbed areas Since the swale is easy to install during early grading operations, it can serve as the first line of defense in reducing runoff across disturbed areas As a method of reducing runoff across the disturbed construction area, it reduces the requirements of structural measures to capture sediment from runoff since the flow is reduced By intercepting sediment-laden flow downstream of the disturbed area, runoff can be directed into a sediment basin or other BMP for sedimentation as opposed to long runs of silt fence, straw bales, or other filtration methods Based on site topography, swales can be effectively used in combination with diversion dikes

Applications

Common applications for interceptor swales include roadway projects, site development projects with substantial offsite flow impacting the site and sites with a large area(s) of disturbance It can be used in conjunction with diversion dikes to intercept flows Temporary swales can be used throughout the project to direct flows away from staging, storage and fueling areas along with specific areas of construction Note that runoff which crosses disturbed areas or is directed into unstabilized swales must be routed into a treatment BMP such as a sediment basin Grass lined swales are an effective permanent stabilization technique The grass effectively filters both sediment and other pollutants while reducing velocity

Design Criteria

- Maximum depth of flow in the swale may be 1 5 feet based on a 2-year design storm peak flow Positive overflow must be provided to accommodate larger storms
- Side slopes of the swale will be 3 1 or flatter
- Minimum design channel freeboard will be 6 inches
- The minimum required channel stabilization for grades less than 2 percent and velocities less than 6 feet per second may be grass, erosion control mats or mulching For grades in excess of 2 percent or velocities exceeding 6 feet per second, stabilization in the form of high velocity erosion control mats, a three inch layer of crushed stone or rip rap is required Velocities greater than 8 feet per second will require approval by the local jurisdiction and is discouraged
- Check dams can be used to reduce velocities in steep swales See check dam BMP fact sheet for design criteria
- Interceptor swales must be designed for flow capacity based on the Manning equation to ensure a proper channel section Alternate channel sections may be used when properly designed and accepted
- Consideration must be given to the possible impact that any swale may have on upstream or downstream conditions
- Swales must maintain positive grade to an acceptable outlet

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Limitations
Interceptor swales must be stabilized quickly after excavation so as not to contribute to the erosion problem they are addressing Swales may be unsuitable to the site conditions (too flat or steep) Flow capacity should be limited for temporary swales For permanent swales, the 1 5 feet maximum depth can be increased as long as provisions for public safety are implemented

Maintenance Requirements
Inspection must be made weekly and after each significant (0 5 inch or greater) rain event to locate and repair any damage to the channel or to clear debris or other obstructions so as not to diminish flow capacity Damage from storms or normal construction activities such as tire ruts or disturbance of swale stabilization should be repaired as soon as practical

DIVERSION DIKE/BERMS

Description
A diversion dike/berm is a compacted soil mound, which redirects runoff to a desired location The dike/berm is typically stabilized with natural grass for low velocities and with stone or erosion control mats for higher velocities

Primary Use
The diversion dike/berm is normally used to intercept offsite flow upstream of the construction area and direct the flow around the disturbed soils It can also be used downstream of the construction area to direct flow into a sediment reduction device such as a sediment basin or protected inlet Alternatively, the diversion dike/berm can be used to contain flow within the construction site if the water is suspected to be contaminated The diversion dike/berm serves the same purpose and, based on the topography of the site, can be used in combination with an interceptor swale

Applications
By intercepting runoff before it has the chance to cause erosion, diversion dikes/berms are very effective in reducing erosion at a reasonable cost They are applicable to a large variety of projects including site developments and linear projects such as roadways and pipeline construction Diversion dikes/berms are normally used as perimeter controls for construction sites with large amounts of offsite flow from neighboring properties Used in combination with swales, the diversion dike/berms can be quickly installed with a minimum of equipment and cost, using the swale excavation as the dike No sediment removal technique is required if the dike is properly stabilized and the runoff is intercepted prior to crossing disturbed areas

Significant savings in structural controls can be realized by using diversion dikes to direct sheet flow to a central area such as a sediment basin or other sediment reduction structure if the runoff crosses disturbed areas

Design Criteria
- The maximum contributing drainage area should be 10 acres or less depending on site conditions
- Maximum depth of flow at the dike will be 1 foot for 2-year design storm
- The maximum width of the flow at the dike will be 20 feet
- Side slopes of the diversion dike will be 3 1 or flatter
- Minimum width of the embankment at the top will be 2 feet
- Minimum embankment height will be 18 inches as measured from the toe of slope on the upgrade side of the berm

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- For velocities less than 6 feet per second, the minimum stabilization for the dike/berm and adjacent flow areas is grass, erosion control mats or mulch For velocities greater than 6 feet per second, stone stabilization or high velocity erosion control mats should be used Velocities greater than 8 feet per second must be approved by the local jurisdiction
- The dikes will remain in place until all disturbed areas that are protected by the dike/berm are permanently stabilized unless other controls are put into place to protect the disturbed area
- Flow line at dike will have a positive grade to drain to a controlled outlet

Limitations
Compacted earth dikes/berms require stabilization immediately upon placement so as not to contribute to the problem they are addressing The diversion dikes can be a hindrance to construction equipment moving on the site, therefore their locations must be carefully planned prior to installation

Maintenance Requirements
Dikes/berms must be inspected on a weekly basis and after each significant (>0 5 inch) rainfall to determine if silt is building up behind the dike, or if erosion is occurring on the face of the dike/berm Silt will be removed in a timely manner If erosion is occurring on the face of the dike, the slopes of the face will either be stabilized through mulch or seeding or the slopes of the face will be reduced

SILT FENCE

Description
A silt fence consists of geotextile fabric supported by poultry netting or other backing stretched between either wooden or metal posts with the lower edge of the fabric securely embedded in the soil The fence is typically located downstream of disturbed areas to intercept runoff in the form of sheet flow Silt fence provides both filtration and time for sedimentation to reduce sediment and it reduces the velocity of the runoff Properly designed silt fence is economical since it can be re-located during construction and re-used on other projects

Primary Use
Silt fence is normally used as perimeter control located downstream of disturbed areas It is only feasible for non-concentrated, sheet flow conditions

Applications
Silt fence is an economical means to treat overland, non-concentrated flows for all types of projects Silt fences are used as perimeter control devices for both site developments and linear (roadway) type projects They are most effective with coarse to silty soil types Due to the potential of clogging, silt fence should not be used with clay soil types

In order to reduce the length of silt fence, it should be placed adjacent to the down slope side of the construction activities

Design Criteria
- Fences are to be constructed along a line of constant elevation (along a contour line) where possible
- Maximum slope adjacent to the fence is 1 1
- Maximum distance of flow to silt fence should be 200 feet or less
- Maximum concentrated flow to silt fence will be 1 CFS per 20 feet of fence
- If 50% or less of soil, by weight, passes the U S Standard sieve No 200, select the equivalent opening size (E O S) to retain 85% of the soil
- Maximum equivalent opening size will be 70 (#70 sieve)

- Minimum equivalent opening size will be 100 (#100 sieve)
- If 85% or more of soil, by weight, passes the U S Standard sieve No 200, silt fences will not be used due to potential clogging
- Sufficient room for the operation of sediment removal equipment will be provided between the silt fence and other obstructions to maintain the fence
- The ends of the fence will be turned upstream to prevent bypass of stormwater

Limitations
Minor ponding will likely occur at the upstream side of the silt fence resulting in minor localized flooding Fences, which are constructed in swales or low areas subject to concentrated flow, may be overtopped resulting in failure of the filter fence Silt fences subject to areas of concentrated flow (waterways with flows > 1 cfs) are not acceptable Silt fence can interfere with construction operations, therefore planning of access routes onto the site is critical Silt fence can fail structurally under heavy storm flows, creating maintenance problems and reducing the effectiveness of the system

Maintenance Requirements
Inspections should be made on a weekly basis, especially after large storm events If the fabric becomes clogged, it should be cleaned or if necessary, replaced. Sediment should be removed when it reaches approximately one-half the height of the fence

STRAW BALE DIKE

Description
A straw bale dike is a temporary barrier constructed of straw bales anchored with wood posts, which is used to intercept sediment-laden runoff generated by small-disturbed areas The straw bales can serve as both a filtration device and a dam/dike device to treat and redirect flow Bales can consist of hay or straw in which straw is defined as best quality straw from wheat, oats or barley, free of weed and grass seed and hay is defined as straw which includes weed and grass seed

Primary Use
A straw bale dike is used to trap sediment-laden storm runoff from small drainage areas with relatively level grades, allowing for reduction of velocity thereby causing sediment to settle out

Applications
Straw bale dikes are used to treat flow after it leaves a disturbed area on a relatively small 1-acre) site Due to the limited life of the straw bale, it is cost effective for small projects of a short duration The limited weight and strength of the straw bale makes it suitable for small, flat (< 2 percent slope) contributing drainage areas Due to the problems with straw degradation and the lack of uniform quality in straw bales, their use is discouraged except for small applications

Straw bales can also be used as check dams (see Check Dam BMP) for small watercourses such as interceptor swales and borrow ditches Due to the problems in securely anchoring the bales, only small watercourses can effectively use straw bale check dams

Design Criteria
- Straw bale dikes are to be constructed along a line of constant elevation (along a contour line)
- Straw bale dikes are suitable only for treating sheet flows across grades of 2% or flatter
- Maximum contributing drainage area will be 0 25 acre per 100 linear feet of dike
- Maximum distance of flow to dike should be 100 feet or less

- Dimensions for individual bales will be 30 inches minimum length, 18 inches minimum height, 24 inches minimum width and will weigh no less than 50 pounds when dry
- Each straw bale will be placed into an excavated trench having a depth of 4 inches and a width just wide enough to accommodate the bales themselves
- Straw bales will be installed in such a way that there is no space between bales to prevent seepage
- Individual bales will be held in place by at least two wooden stakes driven a minimum distance of 6 inches below the 4 inch excavated trench to undisturbed ground, with the first stake driven at an angle toward the previously installed bale
- The ends of the dike will be turned upgrade to prevent bypass of stormwater
- Place bales on sides such that bindings are not buried

Limitations
Due to a short effective life caused by biological decomposition, straw bales must be replaced after a period of no more than 3 months During the wet and warm seasons, however, they must be replaced more frequently as is determined by periodic inspections for structural integrity

Straw bale dikes are not recommended for use with concentrated flows of any kind except for small check flows in which they can serve as a check dam The effectiveness of straw bales in reducing sediment is very limited Improperly maintained, straw bales can have a negative impact on the water quality of the runoff

Maintenance Requirements
Straw bales will be replaced if there are signs of degradation such as straw located downstream from the bales, structural deficiencies due to rotting straw in the bale or other signs of deterioration Sediment should be removed from behind the bales when it reaches a depth of approximately 6 inches

ATTACHMENT 3
LOW LEVEL MIXED AND LOW LEVEL WASTE SHIPMENTS

This attachment documents the environmental impacts of shipping LLMW and LLW from RFETS to appropriate disposal facilities The analysis includes all projected RFETS LLMW/LLW shipments from facility disposition Impacts associated with disposal at the receiving sites are not addressed Two means of shipment are considered, shipment of LLMW/LLW via truck, and shipment of LLMW/LLW via rail and rail/truck (intermodal) Section 3 1 describes transportation activities related to truck shipments, and activities related to rail or intermodal shipments Section 3 3 describes projected impacts from the use of truck shipments, and Section 3 4 describes projected impacts from rail or intermodal shipments

3.1 Activities Analyzed

Truck Shipments

DOE proposes to ship RFETS LLMW and LLW generated as part of previous Site operations and during facility disposition activities to off-site disposal locations Specifically, the proposed action calls for shipment of LLMW to the Envirocare disposal facilities located at Clive, Utah during the years 1998 through 2000, and to DOE's Hanford Site in Richland, Washington during the years 2001 through 2009, or until RFETS site closure Also included in the proposed action is shipment of RFETS LLW to DOE's Nevada Test Site (NTS) in Nye County, Nevada Each of these facilities is permitted to receive and dispose of the waste types to be shipped from RFETS, and has the capacity to accept the volume of wastes anticipated in the shipments analyzed

Estimates of the number of proposed shipments, by destination, over the Rocky Flats closure period are presented in Table 3-1 Based on this estimate, a total of 7,045 shipments would be required during RFETS closure The maximum number of shipments in any given year is estimated to be 761 during the year 2001 Expected maximum annual shipments by individual waste type and destination would be as follows

- LLMW to Envirocare 264 (FY 2000)
- LLMW to Hanford 520 (FY 2001)
- LLW to NTS 392 (FY 2009)

Table 3-1. Summary of RFETS Closure Project LLMW and LLW Shipments

Fiscal Year	Estimated Number of Shipments		
	Envirocare (LLMW)	Hanford (LLMW)	NTS (LLW)
1998	139		147
1999	138		314
2000	264		265
2001		520	241
2002		232	370
2003		270	359
2004		382	297
2005		393	249
2006		412	197
2007		411	177
2008		343	244
2009		189	392
Total	541	3,152	3,252

Waste materials would be shipped in U S Department of Transportation (DOT) approved Type A containers which would be either 55-gallon drums, or waste crates constructed according to the requirements of applicable paragraphs of Title 49 of the Code of Federal Regulations Type A packages are designed to prevent the loss or dispersal of their contents when subjected to a specified set of "normal" transportation conditions These conditions are specified to include mishandling and minor accidents Type A packages are regulated by DOT in consultation with the U S Nuclear Regulatory Commission (NRC)

For wastes packaged in 55-gallon drums, individual trucks would be loaded with between 25 and 33 cubic meters (m^3) of LLMW or LLW Shipments packaged in waste crates may be loaded to 40 m^3 per truck Shipments would travel approximately 570 miles to Envirocare, 812 miles to NTS, and 1115 miles to Hanford

Rail or Intermodal (Rail and Rail/Truck) Shipments

Shipment via rail or intermodal transport is also considered This choice would consist of shipping the LLMW and LLW via railroad from RFETS to the destination sites, or, in cases where disposal sites are not served directly by rail, RFETS waste shipments would be unloaded at the rail depot nearest the disposal site and trucked the remaining distance Although rail carriers and routes have not been formally identified, shipments to the disposal sites under consideration are, for this alternative, defined as follows

- Envirocare – Shipments would proceed westward through western Colorado, across Utah and directly into the Envirocare site Because of site limitations on the amount of plutonium that can be resident above ground at any one time, the volume of LLMW that can be shipped on a single train may be limited These limits were not taken into account in estimating environmental impacts in this EA
- Hanford – Shipments would move northward through Wyoming and Montana and then westward through eastern Washington directly into the Hanford site

- Nevada Test Site (NTS) – A direct rail connection into NTS is not available Shipments would move westward across Utah and Nevada to a transfer station in eastern California, where wastes would be transferred and shipped the remaining distance to NTS via truck, a distance of approximately 150 miles

Although precise logistics for individual shipments would be determined on a case-by-case basis, rail cars could be loaded with up to 60 m^3 of waste, depending on the container type and waste characteristics Preliminary economic evaluation of waste characteristics indicates that about 500 m^3 of waste would have to be shipped per train in order for this alternative to be cost effective Waste forms and shipping containers would be identical to those described above

3.2 Scope and Approach of Analysis

The evaluated resource areas are air quality, human health and safety, traffic and environmental justice These four areas were identified as being potentially affected by the proposed action Each area is identified and evaluated by shipping mode Section 3 3 discusses impacts from the trucking alternative, Section 3 4 discusses impacts from the mixed mode—rail and trucking—alternative

Environmental impact evaluations were derived, where appropriate, from the analyses and results presented in the CID (DOE 1997) The CID provides a broad-scope environmental impact analysis of activities planned to achieve the current RFETS mission of site cleanup The CID also provides an assessment of the cumulative impacts of closure activities Environmental impacts of transportation activities similar to those addressed here were evaluated in the CID as part of its Closure Case

As used in the CID, "environmental restoration" included both decommissioning and soil remediation activities For this attachment, characteristics of disposition wastes were assumed to be the same as the CID "environmental restoration" wastes

3.3 Environmental Impacts - Trucking

3.3.1 Air Quality

Air quality impacts resulting from RFETS site cleanup activities were assessed in the CID This analysis included consideration of the impacts of particulate fugitive dust emissions from vehicle travel on paved and unpaved roads, including the development of concentration estimates for both particulate matter with aerodynamic diameters less than 10 micrometers (PM-10), and total suspended particulates (TSP) For the Closure Case, it was estimated that concentrations of both types would be considerably less than the occupational exposure standard, and less than 10 per cent of the relevant air quality standard Because emission levels for both particulate types were below exposure standards, impacts from fugitive dust were not found to be significant Because vehicle movement creates only a portion of the Site-wide particulate emissions generated by closure activities, and transportation activities analyzed here represent only a small fraction of total RFETS vehicle movements, air quality impacts from fugitive dust emissions from LLMW and LLW waste shipments are expected to be small Public health impacts from vehicle exhaust emissions are discussed in Section 3 3 2 1

3.3.2 Human Health and Safety

Potential impacts on human health and safety from transportation of LLMW and LLW from both vehicle- and cargo-related impacts are presented in this section Vehicle-related impacts are those associated with the number of truck shipments described in Section 3 1, without regard to the nature of the cargo carried Cargo-related impacts are those which are associated with the physical nature of the materials being transported (e g , radioactive wastes)

3.3.2.1 Impacts from Routine Operations

Vehicle-Related Impacts

Human health impacts from routine transportation activities include those related to, or caused by, tailpipe emissions, fugitive dust from vehicle movement, and other airborne particulate releases from sources such as tires and brakes Such impacts are not unique to a specific population, therefore, the results of this impact analysis are presented for the population as a whole, without differentiating between workers and the public

Impacts from transportation-related emissions developed for truck transport in an urban environment by Rao (Rao 1982) identified a risk factor of $1\ 6 \times 10^{-7}$ latent cancer fatalities per mile for such shipments Applying this factor to the maximum annual shipment mileage to each of the waste disposal sites yields the impact estimates presented in Table 3-2

Table 3-2. Vehicle-related Impacts from Routine Operations

Destination/Maximum No of Annual Shipments	Maximum Annual Mileage	Estimated Latent Cancer Fatalities
Envirocare/264	150,480	$2\ 4 \times 10^{-2}$
Hanford/520	579,800	$9\ 3 \times 10^{-2}$
NTS/392	318,304	$5\ 1 \times 10^{-2}$
Maximum Individual Year/761	775,492	$1\ 2 \times 10^{-1}$

The estimates provided in Table 3-2 are conservative and probably overstate the actual risk for two reasons First, the estimates are based on transportation in an urban environment, whereas the truck routes between RFETS and the destination-sites are dominated by low rural population densities Second, significant improvements have been made since 1982 in vehicle tires, fuels, engines, and emissions, thereby reducing the human health impacts from transportation activities

Cargo-Related Impacts

Because the DOT regulates shipping container design to meet stringent safety requirements applicable to the transport of the types of materials being shipped, it is anticipated that releases of toxic or

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hazardous chemicals would not occur dunng routine transportation activities Impacts associated with accidents are addressed in Section 3 3 2 2

Releases of radioactive matenals also would not be expected dunng routine transportation activities because of stnngent packaging requirements However, workers and the public may be exposed to external radiation emanating from LLMW and LLW being transported to disposal sites Applying the impact results from the CID (Table A-26) on a per-shipment basis yields estimates of annual radiological impacts from the proposed routine transportation activities These estimates are presented in Tables 3-3 and 3-4 The tables present separate estimates for operations-denved and facility disposition wastes Operations wastes are expected to have higher concentrations of radioactive matenals, and consequently higher levels of impact, as illustrated in Table 3-3 Table 3-4 presents the anticipated impact data for the less toxic facility disposition wastes

Table 3-3. Incident-free Transportation Impacts from Routine Operations - Maximum Annual Shipments (using operations data)

Destination	Collective Dose (Person-Rem)		MEI Dose (Rem)		Estimated Excess Latent Cancer Fatalities	
	Worker	Public	Worker	Public	Worker	Public
Envirocare	12 5	27 1	6 6	NR	0 005	0 001
Hanford	0 73	5 2	0 36	NR	0 0003	0 002
NTS	25 1	53	13	0 0005	0 001	0 026

NR – Not reported

Table 3-4. Incident-free Transportation Impacts from Routine Operations - Maximum Annual Shipments (using facility disposition data)

Destination	Collective Dose (Person-Rem)		MEI Dose (Rem)		Estimated Excess Latent Cancer Fatalities	
	Worker	Public	Worker	Public	Worker	Public
Envirocare	0 22	1 4	0 25	NR	$8\ 8 \times 10^{-5}$	$7\ 0 \times 10^{-4}$
Hanford	0 73	5 2	0 36	NR	$2\ 9 \times 10^{-4}$	$2\ 6 \times 10^{-3}$
NTS	0 43	2 9	0 21	NR	$1\ 7 \times 10^{-4}$	$1\ 4 \times 10^{-3}$

NR – Not reported

Shipments anticipated under the proposed action would be compnsed of wastes from both operations and facility disposition Overall, these results indicate that the cumulative estimated latent cancer fatalities from both types of cargo dunng the highest-shipment year would total much less than one latent cancer fatality for the combined worker and public populations

3.3 2.2 Impacts from Accidents

<u>Vehicle-Related Impacts</u>
Impacts associated with physical trauma resulting from traffic accidents were denved by using estimated unit transportation accident fatality rates in fatalities per mile (CID, Table A-28) These

unit rates were multiplied by the transportation mileage for the year of maximum shipments to each of the destinations Results of this analysis are presented in Table 3-5

Table 3-5. Estimated Fatalities from Maximum Year Transportation Activities

Destination	Maximum Annual Mileage	Unit Fatality Rate	Estimated Annual Fatalities
Envirocare	150,480	1 01 x 10^{-7}	1 2 x 10^{-2}
Hanford	579,800	1 02 x 10^{-7}	5 1 x 10^{-2}
NTS	318,304	9 15 x 10^{-8}	2 1 x 10^{-2}

Cargo-Related Impacts

Applying the impact results from the CID (Table A-39) on a per-shipment basis yields an estimate of radiological impacts and impacts from toxic or hazardous chemicals released during transportation accidents These are presented in Table 5-6 Since the CID analysis considered only asbestos as a non-radiological contaminant in shipments to Hanford, the CID results were adjusted to account for the cancer potency quotient of beryllium (see CID Table A-32) anticipated for Hanford shipments These upward adjustments are reflected in the results of Table 3-6

Table 3-6. Estimated Environmental Effects of Accidents - Maximum Annual Shipments

Destination	Radiological Impacts		Chemical Hazards (member of public)	
	Accident Dose (Person-Rem)	Excess Cancer Fatalities	Carcinogenic Risk	Non-carcinogenic Risk
Envirocare	8 7	4 4 x 10^{-3}	5 3 x 10^{-10}	5 8 x 10^{-7}
Hanford	15 6	7 8 x 10^{-3}	7 4 x 10^{-11}	1 9 x 10^{-6}
NTS	11 4	5 7 x 10^{-3}	NA	NA

NA – Not applicable

3.3.3 Traffic

Assuming shipment operations take place five days per week and fifty weeks per year, the maximum annual shipments of LLMW and LLW would correspond to about 3 truck departures per day The average annual shipments of LLMW and LLW would correspond to an average of between 2 and 3 shipments per day The CID estimates (Closure Case) truck traffic volume for an average year, and for the highest volume year, as 99 and 112 shipments per day, respectively (CID Table 5 6-1)

For the Closure Case truck shipments, the CID states "truck traffic would be 8 to 10 times higher than during the Baseline Case due to the very large volumes of waste being transported over-the-road for off-site disposal This increase in truck traffic volume is high enough to be noticeable on the highways in the immediate vicinity of the Site, but would be scheduled such that it would not add to overall local road congestion " Based on this assessment, and the fact that LLMW/LLW shipments would be a small fraction of overall shipments from RFETS, it is expected that traffic impacts from these shipments would be minimal Shipment of LLMW/LLW for disposal is an integral part of the RFETS closure process Over the long term as site closure is completed, traffic volume on local roads from RFETS activities would be essentially eliminated, resulting in a reduction of more than 6500 daily commuter and commercial trips to and from the Site

3.3.4 Environmental Justice

In accordance with Executive Order 12898, the potential impact of off-site shipment of LLMW and LLW on minority and low-income populations has been evaluated The proposed action was assessed to determine if disproportionately high and adverse human health or environmental effects would be imposed on these populations

The analysis detailed in Section 3 3 2 1 indicates that incident-free LLMW/LLW shipping operations present very low risk to the overall population, and do not constitute a reasonably foreseeable adverse impact to the population surrounding RFETS Because there is very low risk to the general population, no disproportionately high and adverse health effects would be expected for any particular segment of the population, including minority and low-income populations Similarly, there is no reason to anticipate that transportation accidents would have a more adverse impact on minority or low-income populations than on the population in general While a disproportionate share of the minority population resides near interstate highways and railroads, the major risks to the public from truck transportation are to travelers on the highways, rather than to residents near the highways The greatest risk to the public results from the physical impact of accidents and incidental exposure during rest stops The risk posed to minority populations could actually be lower than the risk to the general population, because minority populations are found to be lower in representation on the interstate highways where these risks would be incurred (DOT, 1992, as cited in DOE 1997a) Therefore, minorities are not expected to receive a disproportionately high share of the truck transportation risks

3.3.5 Cumulative Impacts

Cumulative impacts are changes to the physical and biological environments that would result from the proposed action in combination with other ongoing actions and reasonably foreseeable future actions A comprehensive analysis of the cumulative impacts for RFETS closure activities can be found in the CID (DOE, 1997b) The CID analyzed the cumulative impacts from ongoing and planned RFETS activities relating to site closure, including the off-site shipment of RFETS LLMW and LLW These analyses were used to identify potential cumulative impacts relating to transportation and health and safety They are summarized briefly below

- Increased off-site waste and facility disposition shipments, including about 100 commercial truck trips per day, may cause congestion at the Site's entrance gates
- Increased waste shipments, facility disposition activities, and decommissioning activities may cause minor changes in noise levels
- The risk of latent cancer fatalities from air pollution, due to routine on-site and off-site transportation, could increase to 1 08 annually
- Increased Special Nuclear Material (SNM) management, decommissioning, and waste management activities would alter the radiological impact on workers to a collective dose of 417 person-rem per year (0 2 excess LCF) The maximum dose to the co-located worker would be about 5 4 mrem per year, which represents an increased cancer risk of 2×10^{-6}, and

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the dose to the general public would be about 23 person-rem per year, or a risk of 0 01 excess LCF The dose to the maximally exposed off-site individual would be about 0 23 mrem per year, which represents an increased cancer risk of 1 x 10^{-7}

- Co-located workers may encounter 7 x 10^{-7} mrem per year of radiation due to potential on-site transportation accidents
- Annual latent cancer fatalities, associated with on-site transportation accidents, could be 1 x 10^{-6} for the general public
- Maximally exposed off-site individuals may encounter 2 x 10^{-6} mrem per year of radiation due to potential on-site transportation accidents
- Off-site transportation accidents could cause 1 x 10^{-1} latent cancer fatalities per year
- Site related collision fatalities, due to worker commuting and over-the-road shipments, are estimated at 1 7 per year
- Illness and injury rates would increase at the Site to approximately 580 cases per year, due to high levels of activity, but would gradually decrease across time with progress toward closure

The potential cumulative impacts resulting from the proposed action and connected actions of the proposed LLMW and LLW disposal at Hanford, NTS, and Envirocare (following shipment from RFETS) are also not expected to be significant The site missions and regulatory licenses for these facilities are consistent with the proposed action and each disposal site has sufficient capacity to handle RFETS waste

3.4 Environmental Impacts - Rail or Intermodal Shipment

3.4.1 Air Quality

The air quality impacts from fuel combustion for transporting cargo by train vs truck were compared in the CID, which referenced an analysis in the *Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* Fuel consumption for trains was compared to fuel consumption for trucks The results showed that a dedicated train could transport the same amount of waste as 239 trucks The fuel consumed by the train on an hourly basis would be 14% of that consumed by trucks Air emissions and related health impacts would be proportionately lower than those resulting from truck transport, as presented in Section 3 3 1

3.4.2 Human Health and Safety

Potential cargo-related impacts on human health and safety from railroad transportation of LLMW/LLW are presented in this section

3.4.2.1 Impacts from Routine Operations

Rail Mode-Related Impacts
As described in Section 3 4 1, the human health impacts from fuel combustion during rail transportation would be approximately 14% of those expected from truck transport

Cargo-Related Impacts
Because stringent shipping container design requirements applicable to transport of toxic or hazardous materials prevent releases, no exposures to these chemicals are expected to occur during routine transportation activities by rail Impacts associated with accidents are discussed in Section 3 4 2 2

The RADTRAN model (version 4 0 19) was used to estimate radiological risks from transport of LLMW/LLW by rail from RFETS to Envirocare, NTS, and Hanford The Interline model (version 5 0) was used to identify rail routes to each destination and the associated distributions among rural, suburban, and urban populations among the areas the route traverses

Inputs to the RADTRAN model were drawn primarily from those used in the CID and from the default data provided in the model itself, with the following additions and exceptions

- Aggregate data for population densities in rural, suburban, and urban areas were estimated using the Interline model for each specific route
- The fractions of travel in rural, suburban, and urban areas for each route were estimated by the Interline model
- The number of handlings per shipment was set to 2 (for initial loading and final unloading) plus the number of transfers along the particular route
- Shipments from RFETS were assumed to originate from Golden, CO for purposes of modeling routes
- For route modeling purposes, destination rail nodes were assumed to be Clive, UT for Envirocare, Richland Junction, WA for Hanford, and Barstow, CA for NTS

The waste characteristics used were those presented in the CID for LLMW/LLW from operations, providing an estimate of the radioactive materials content of waste Because actual shipments would contain a combination of LLMW from both operations and facility disposition activities, the resulting estimates are higher than expected during actual operation

The per-shipment estimates of radiological health effects from routine rail transportation are presented in Table 3-7 The cumulative doses from all shipments for each destination's highest volume year are presented in Table 3-8

Table 3-7. Incident-Free Transportation Impacts Per Shipment of LLMW/LLW by Rail

Destination	Collective Dose (person-rem)		MEI Dose (rem)		Estimated Excess Latent Cancer Fatalities	
	Worker	Public	Worker	Public	Worker	Public
Envirocare	0 00715	0 000333	0 00143	$6\ 19 \times 10^{-8}$	$2\ 86 \times 10^{-6}$	$1\ 66 \times 10^{-7}$
Hanford	0 0107	0 000495	0 00214	$6\ 19 \times 10^{-8}$	$4\ 28 \times 10^{-6}$	$2\ 48 \times 10^{-7}$
NTS	0 00993	0 000460	0 00199	$6\ 19 \times 10^{-8}$	$3\ 97 \times 10^{-6}$	$2\ 30 \times 10^{-7}$

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Table 3-8. Incident-Free Transportation Impacts for Maximum Year Shipments of LLMW/LLW by Rail

Destination	Collective Dose (person-rem)		MEI Dose (rem)		Estimated Excess Latent Cancer Fatalities	
	Worker	Public	Worker	Public	Worker	Public
Envirocare	1 01	0 0469	0 202	$8\ 73 \times 10^{-6}$	$4\ 04 \times 10^{-4}$	$2\ 34 \times 10^{-5}$
Hanford	2 97	0 137	0 594	$1\ 72 \times 10^{-5}$	$1\ 19 \times 10^{-3}$	$6\ 85 \times 10^{-5}$
NTS	2 08	0 0962	0 416	$1\ 29 \times 10^{-5}$	$8\ 32 \times 10^{-4}$	$4\ 81 \times 10^{-5}$

Doses presented in Tables 3-7 and 3-8 are for operations-derived LLMW/LLW Doses to workers and the public from facility disposition-derived LLMW/LLW would be lower than those shown, by approximately a factor of 80, according to the analysis presented in the CID

The RADTRAN analyses indicate that there would be much less than one latent cancer fatality among both workers and members of the public for the maximum shipment year of LLMW/LLW from RFETS to any of the three sites evaluated

3.4.2.2 Impacts from Accidents

Rail Mode-Related Impacts
As discussed in the CID, train transport has been shown to be safer than vehicular transport with respect to accidents According to the Association of American Railroads, rail transport is five times safer for carrying hazardous materials than truck transportation in terms of accidents per ton-mile Also, railroads ensure that the shipment is better separated from other traffic and the public Thus, a rail accident is also less likely to result in fatalities

Cargo-Related Impacts
RADTRAN analysis was used to estimate radiological health risks in the case of an accident during rail shipment of operations-derived LLMW/LLW from RFETS, based on the number of shipments to each destination in the highest volume shipment year The results are presented in Table 3-9

Table 3-9. Radiological Health Risks--Accident Analysis of Rail Shipments of RFETS LLMW/LLW

Destination	Dose (person-rem)	Excess Cancer Fatalities
Envirocare	$1\ 24 \times 10^{-3}$	$6\ 20 \times 10^{-7}$
Hanford	$2\ 74 \times 10^{-3}$	$1\ 37 \times 10^{-6}$
NTS	$2\ 46 \times 10^{-3}$	$1\ 23 \times 10^{-6}$

Risks from nonradiological chemical exposures during a rail accident for facility disposition-derived LLMW/LLW were calculated in the CID On a per-shipment basis, the risk of cancer incidence is $2\ 60 \times 10^{-13}$ and the hazard index for risks from non-cancer effects is $2\ 02 \times 10^{-9}$ Risks from chemical exposures in an accident are expected to be of similar magnitude

3.4.3 Environmental Justice

Section 3 4 2 1 indicates that incident-free LLMW/LLW shipping operations present very low risk to the overall population, and do not constitute a reasonably foreseeable adverse impact to the population surrounding RFETS As in the case of the proposed action, because there is very low risk to the general population, no disproportionately high adverse health effects from onsite activities culminating in transport by rail would be expected for any particular segment of the population, including minority and low-income populations

With respect to the proposed transportation routes, the primary risks to the public for rail shipments are from radiological exposure during classification and switching which occurs in rail yards primarily at the start and end of each shipment, and from diesel exhaust emissions from locomotives in urban areas Although adverse impacts could occur in the unlikely event of a serious, high volume accident, and disproportional adverse impacts to any population segment, would be subject to the random combination of factors that produce such impacts (Appendix C of WM PEIS)

3.4.4 Cumulative Impacts

Potential cumulative impacts from offsite rail or intermodal shipment of RFETS LLMW and LLW would be similar to the impacts discussed in Section 3 3 5

3.5 Conclusions

Overall, the analyses presented above indicate that impacts of shipping LLMW and LLW from RFETS to disposal sites on air quality, human health and safety, traffic, and environmental justice would be minimal The cumulative impacts of LLMW/LLW shipping, taken together with impacts of other ongoing and reasonably foreseeable future actions, are expected to be minor In fact, the CID indicates that shipping the LLMW and LLW off-site helps to reduce the overall risk to workers, co-located workers, and the public when compared to the risk of continued storage on-site

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